Instruction Manual

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  According to Software Version

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Read this instruction manual thoroughly before installation, operation, maintenance or inspection of this product.

Symbols for Safe Operation

In this manual, NOTES FOR SAFE OPERATION are classified as "WARNING" or "CAUTION".

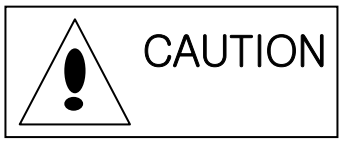
Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to personnel.

Indicates a potentially hazardous situation which, may result in minor or moderate injury to personnel, and possible damage to equipment if not avoided, it may also be used to alert against unsafe practices.

- ◆ Items described in Caution may also result in a vital accident in some situations. In cither case, follow these important notes.

◈ Note for Safe Operation

◆ INSTALLATION



- Make sure to keep the install direction.
- Do not throw down and prevent from impact.
- Never use the equipment where it may be exposed to splashes of water, corrosive or flammable gases, or near flammable materials.(Failure to observe this warning may lead to electric shock or fire)
- Use the equipment in indoors.

◆ WIRING

- For the input power supply of Servo drive, surely use AC200~230[V]
- Make sure to ground the ground terminal.
- Never connect the AC main circuit power supply to servo motor.
- Never connect the AC main circuit power supply to output terminals U, V and W.
- Use the compression terminal with insulated tube when wire the power terminal.
- Make sure that Power cable(U,V,W) and Encoder cable are separated when Connected.
- If the motor moves by Machine, please use Robot Cable.
- Disconnect the power wires surely after the input power is off and “CHARGE” Lamp is completely OFF.
- Surely use Twist pair shield cable for pulse command signal (PF+, PF-, PR+, PR-), speed command signal(SPDCOM), torque limit signal(TRQLIM).

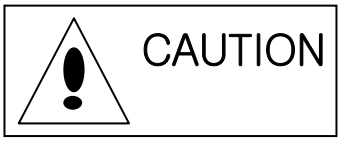
◆ OPERATION

- Before starting operation, check and adjust each menu.
- During operation, do not touch the shaft of motor.
- During operation, do not touch the heat sink.
- Do not connect or disconnect CN1, CN2, CN3 connectors while power is applied to the circuit.

◆ GENERAL PRECAUTIONS

- Specifications are subject to change for product modifications and improvements. In this case, we issue the manual on updated Version NO.

◆ Precaution at First Setup



- Make sure the Power Supply voltage (AC200~230[V]) and wiring before power is applied to the circuit.
- At first power apply, applied the power on Servo-OFF status.
- Verify the model No. of motor and the No. of Encoder pulse before power is applied to the circuit.
- Set the motor ID on menu[PE-201], number of Encoder Pulse on menu [PE-204]
- After finishing the above, set the operation mode of servo drive by linking upper motion controller on the menu [PE-601].
- Wire CN1 if servo drive according to each operation mode referring to “1.2 System Construction”(Refer to “5.5 Example of connecting to upper Controller”)
- The ON/OFF state of each CN1 input contacts can be verified at CN1 contacts state.

◆ MAINTENANCE AND INSPECTION

- After turning OFF Control power supply L1C, L2C, and main power supply L1, L2, L3 then wait enough time (Until the charge lamp is turned off), Proceed the maintenance and inspection. High voltage still remains in the internal condenser.
- Never touch the high-voltage terminals at first power apply.
- Do not repair, inspect, and replace the component except for authorized person.
- The alteration of products is not allowed in any case

Contents

◈ Precaution

1. Product Configuration and Main Function

1.1 Product Configuration

1.1.1 Checking Products 1-2

1.1.2 Identifying 1-4

1.2 System Composition

1.2.1 Summary 1-7

1.2.2 Drawing of Wiring 1-9

1.2.3 Position Operation Mode 1-10

1.2.4 Speed Operation Mode 1-11

1.2.5 Torque Operation Mode 1-12

1.2.6 Speed/Position Operation Mode 1-13

1.2.7 Speed/Torque Operation Mode 1-14

1.2.8 Position/Torque Operation Mode 1-15

1.3 Signal Explanation

1.3.1 Input contact Signal 1-16

1.3.2 Analog input contact Signal 1-17

1.3.3 Pulse input contact Signal 1-17

1.3.4 Output contact Signal 1-18

1.3.5 Monitor Output Signal and Output Voltage 1-18

1.3.6 ENCODER Output Signal 1-18

2. Installation

2.1 Servo Motor

2.1.1 Operating Environment 2-2

2.1.2 Preventing Excessive Impact 2-2

2.1.3 Wring 2-2

2.1.4 Assembling Load System 2-3

2.1.5 Cable Installation 2-3

2.2 Servo Drive

2.2.1 Operating Environment 2-4

2.2.2 Installation in a Control Board (Panel) 2-5

2.2.3 Wring 2-6

3. Wiring

3.1 Internal Block Diagram

3.1.1 Block Diagram (Rated Output is less than 400[V]) 3-2

3.2 Power Board Wring

3.2.1 Wiring Diagram (Rated Output is less than 400[V]) 3-3
3.2.2 Power Board Part Specification 3-4

3.3 Timing Diagram

3.3.1 Timing Diagram at Supplying Power 3-5
3.3.2 Timing Diagram at Alarm 3-6

3.4 Wiring control Signal

3.4.1 Contact Input Signal 3-7
3.4.2 Contact Output Signal 3-7
3.4.3 Analog I/O Signal 3-8
3.4.4 Pulse Input Signal 3-9
3.4.5 Encoder Output Signal 3-10

3.5 Incremental Encoder Signal (CN2) Wiring

3.5.1 Small-size Motor 3-11
3.5.2 Medium/Large, Special/Large-size Motor 3-11

4. Detail Explanation of Program Menu

4.1 How to Operate Loader

4.1.1 Identifying 4-2
4.1.2 Menu Operate 4-2

4.2 Menu

4.2.1 Menu Summary 4-4
4.2.2 Display Operation State 4-5
4.2.3 Display Alarm State 4-9
4.2.4 Setting System Variable 4-10
4.2.5 Setting Control Variables 4-13
4.2.6 Setting Analog I/O Variables 4-21
4.2.7 Setting I/O Connecting Variables 4-26
4.2.8 Setting Speed Operation Variables 4-32
4.2.9 Setting Position Operation Variables 4-35
4.2.10 Operation Menu 4-38

5. Handling and Operation

5.1 Check Point before Operation

5.1.1 Wiring Check ····· 5-2
5.1.2 Operation Signal (CN1) Wiring check ····· 5-2
5.1.3 Environment Check ····· 5-2
5.1.4 Machine State Check ····· 5-2
5.1.5 Menu Variables Check ····· 5-2

5.2 Handling

5.2.1 Alarm Reset ····· 5-3
5.2.2 Alarm History Clear ····· 5-3
5.2.3 Menu initialization ····· 5-3
5.2.4 Prohibiting Menu Handling····· 5-3
5.2.5 Input contact Logic setting····· 5-4
5.2.6 Output contact Logic Operation····· 5-5
5.2.7 Compulsory Handing Input Contact ON/OFF····· 5-6

5.3 Adjustment

5.3.1 Current Offset Tuning ····· 5-7
5.3.2 Analog speed current offset Tuning····· 5-7
5.3.3 Analog Torque current offset Tuning····· 5-8

5.4 Test Operation

5.4.1 Manual Test Operation ····· 5-9
5.4.2 Continuance Test Operation····· 5-9
5.4.3 Z phase Position Operation ····· 5-10
5.4.4 Manual Position Operation ····· 5-10
Analog speed current offset Tuning

6. Product Specification

6.1 Servo Motor

6.1.1 Features ····· 6-2
6.1.2 External Dimensions ····· 6-12

6.2 Servo Drive

6.2.1 Features ····· 6-19
6.2.2 External Dimensions ····· 6-20

6.3 Option and Peripherals

····· 6-21

7. Maintenance and Inspection

7.1 Maintenance and Inspection

7.1.1 Caution ····· 7-2

7.1.2 Inspection Items ····· 7-3

7.1.3 Period of Replacing Parts ····· 7-4

7.2 Fault Diagnosis and Corrective Actions

7.2.1 Servo Motor ····· 7-5

7.2.2 Servo Drive ····· 7-6

[Appendix]

Appendix 1 summary Program Menu ····· 8-2

Appendix 2 Motor type and ID ····· 8-14

Appendix 3 Test Operation Process ····· 8-16

◈ Guarantee Letter

Chapter1

Product Configuration and Signals

1.1 Product Configuration

1.1.1 Checking Products 1-2
1.1.2 Identifying the Parts 1-4

1.2 System Composition

1.2.1 Summary 1-7
1.2.2 Wiring 1-9
1.2.3 Position Operation Mode 1-10
1.2.4 Speed Operation Mode..... 1-11
1.2.5 Torque Operation Mode..... 1-12
1.2.6 Speed/Position Operation Mode 1-13
1.2.7 Speed/Torque Operation Mode 1-14
1.2.8 Position/Torque Operation Mode 1-15

1.3 Signal Explanation

1.3.1 Input Contacts Signal 1-16
1.3.2 Analog Input Signal 1-17
1.3.3 Pulse Input Signal 1-17
1.3.4 Output Contacts Signal 1-18
1.3.5 Monitor Output Signal and Output Power Supply..... 1-18
1.3.6 ENCODER Output Signal 1-18

Product Construction

1.1.1 Checking Products

① Check if the products are the right one you ordered.

- Check the types marked in the nameplates of Servo Drive
- Check the types marked in the nameplates of Servo Motor

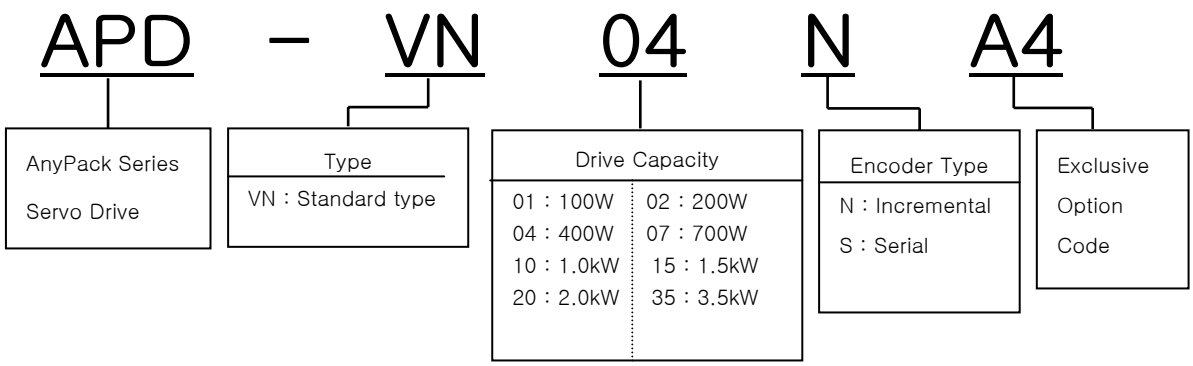
② Check Product and Option Items.

- Check if the cable types and length are right.
- Check if the regenerative resistance is in accordance with the standard.
- Check if the motor shaft is correct.
- Check if the Oil Seal and Brake is correct.
- Check if the reducer/gearbox and reduction ratio is correct.
- Check if the Encoder type is correct.

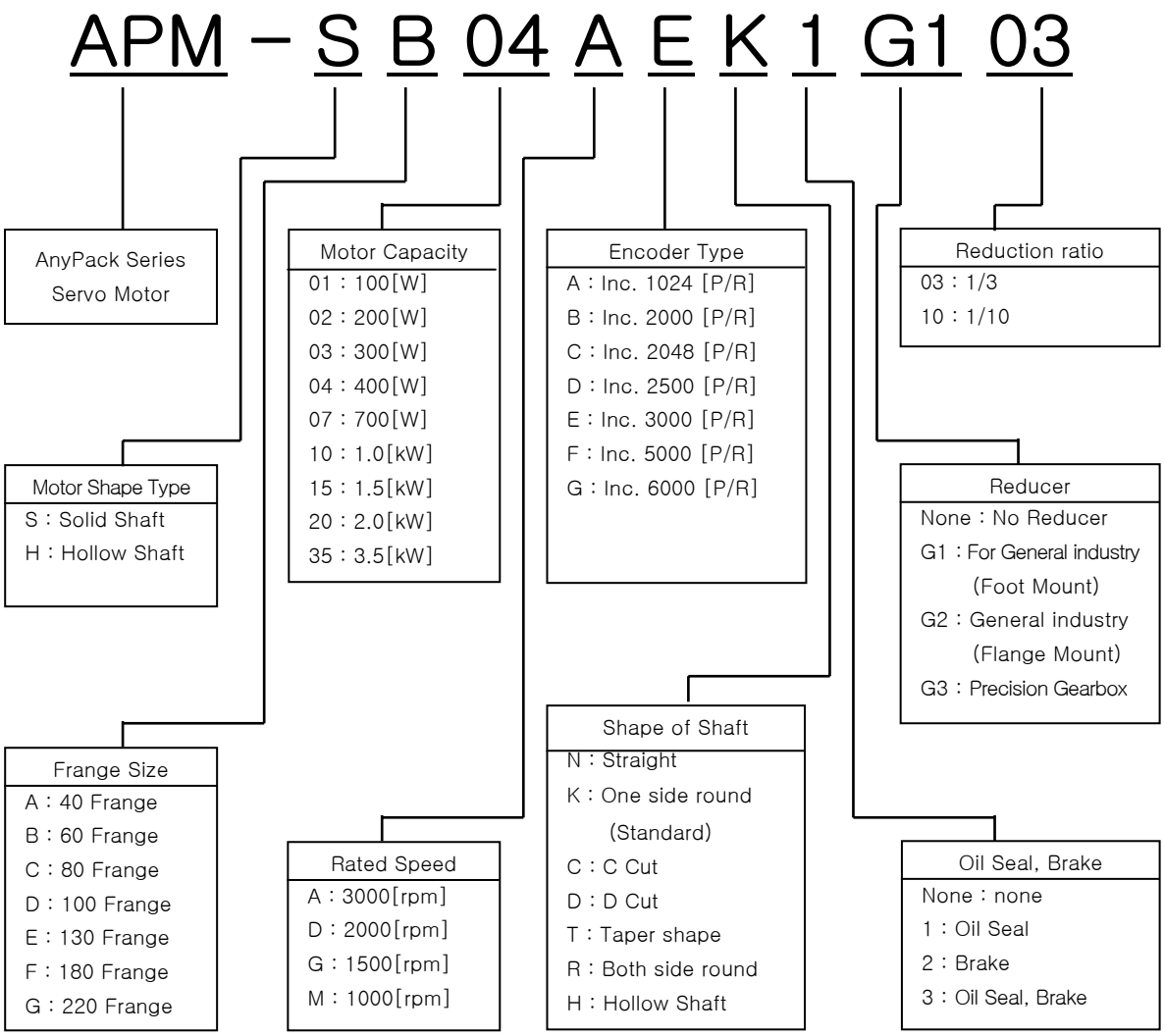
③ Check the External Appearance

- Check if there is no dust or moisture
- Check if there is fading, contamination, damage, and disconnection
- Check if the tightness of fitting & bolts are correct.
- Check if there is no noise or excessive friction at rotating

■ Servo drive Type Designation



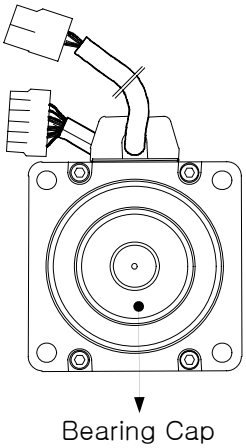
■ Servo Motor Product Type

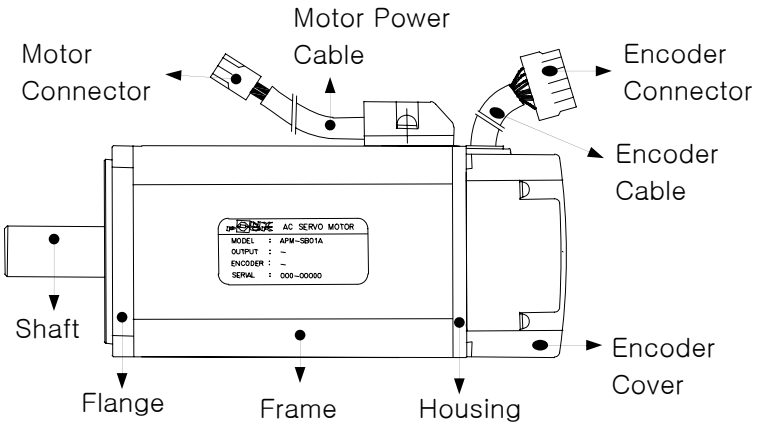


Identifying the Parts

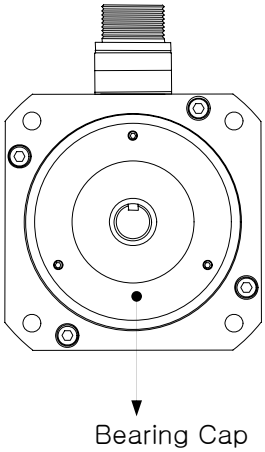
■ Servo Motor

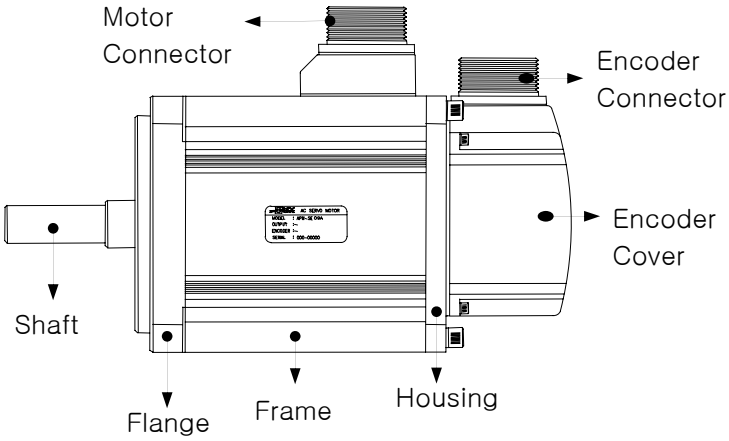
- Less than 80 Flange





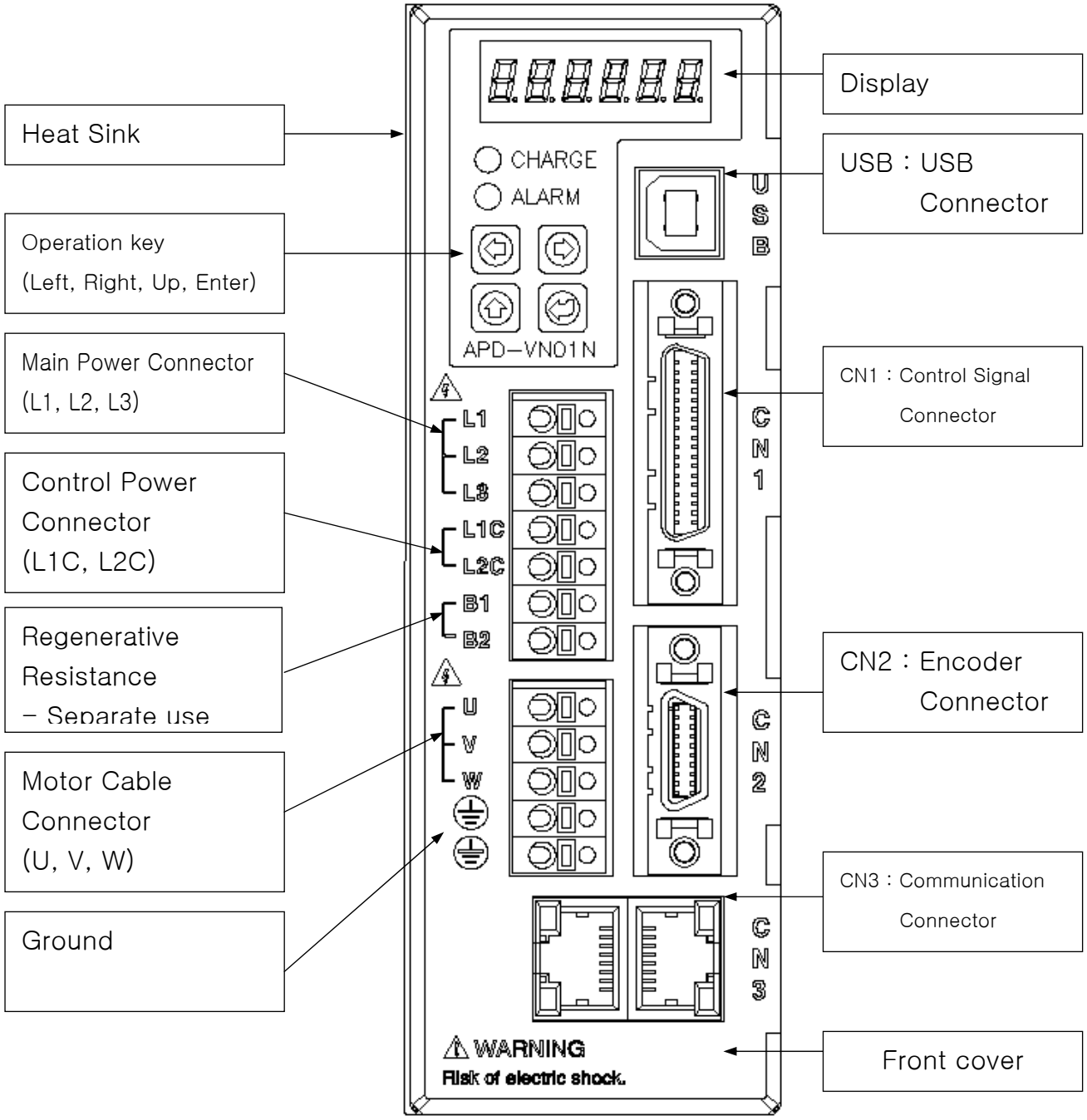
- Over than 130 Flange



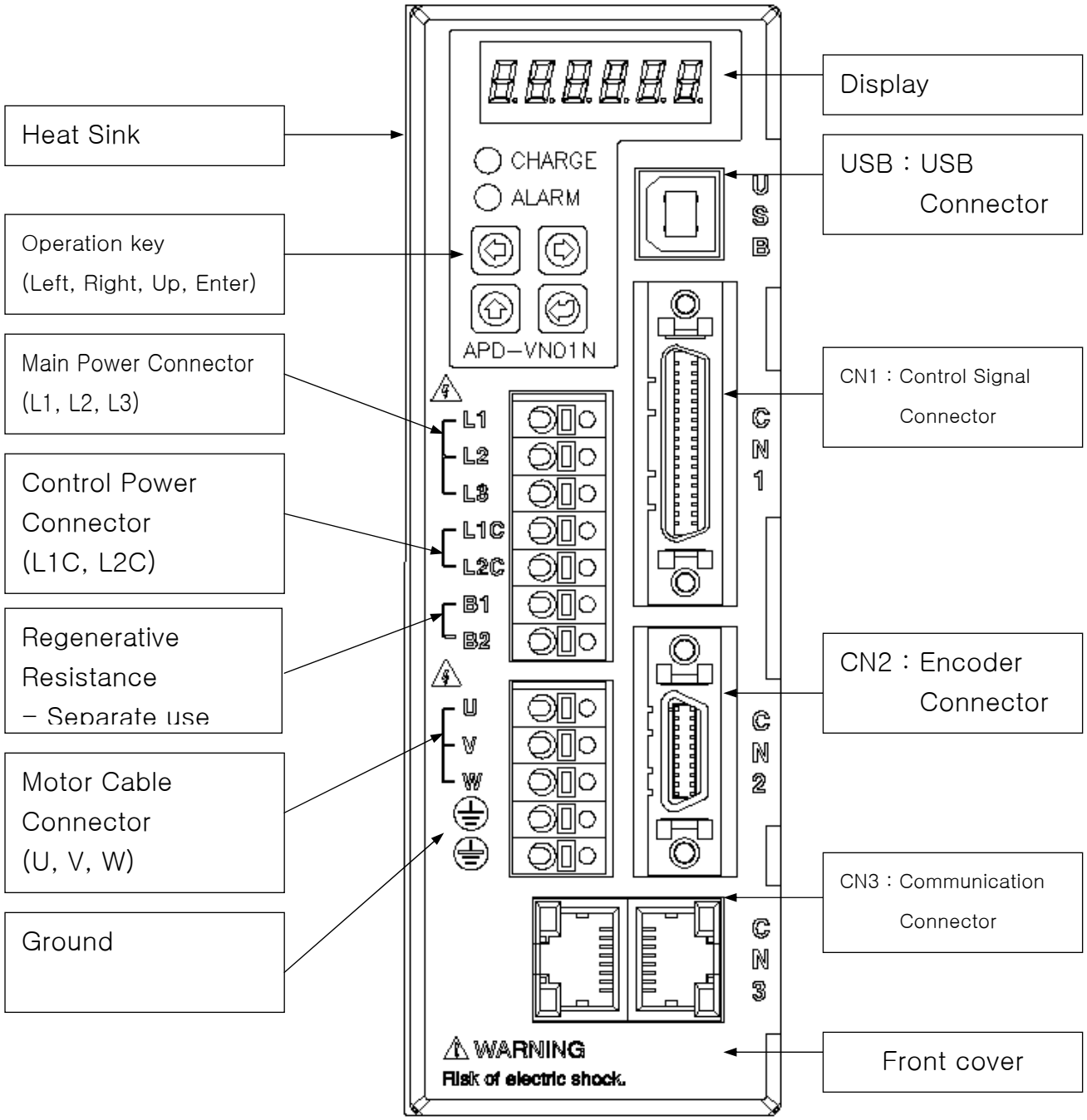


■ Servo Drive

- Small Capacity (APD-VN01 ~ VN02)



- Small Capacity (APD-VN04i)



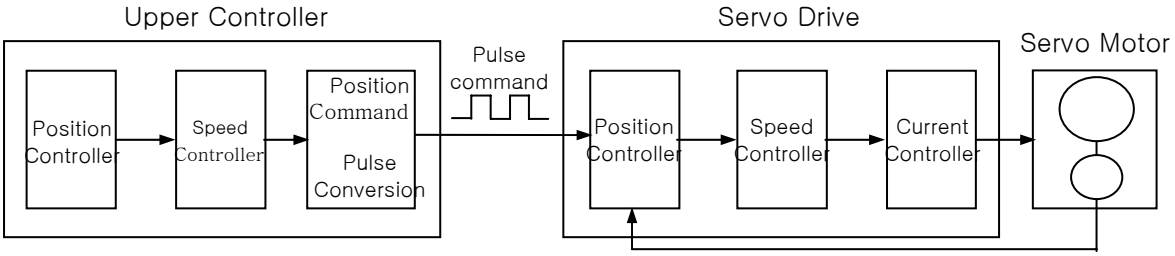
1.2 System Composition

1.2.1 Summary

Servo System can be variously used as per the interface with Upper controller.

1) Position Operation System

Operate Servo by pulse command that operates the position of servo motor by ration of encoder pulse compared to command pulse.



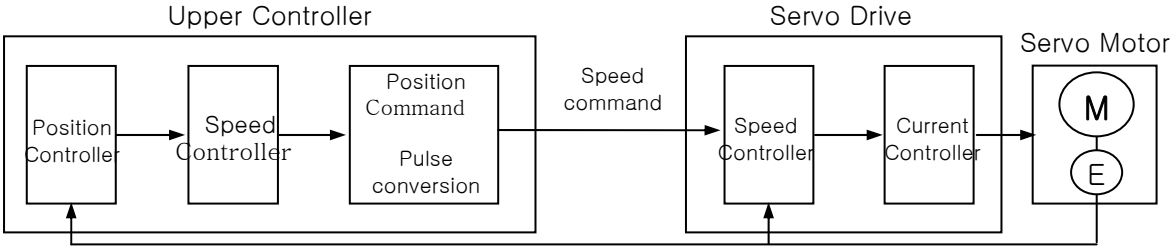
Strength : Because of pulse input by transfer unit, upper controller is simple.

Weakness : High speed rotating is difficult at using precise transfer unit

Response characteristics are not good by using various steps of controller.

2) Speed Operation System

Operating servo by speed command that is analog or digital speed command.



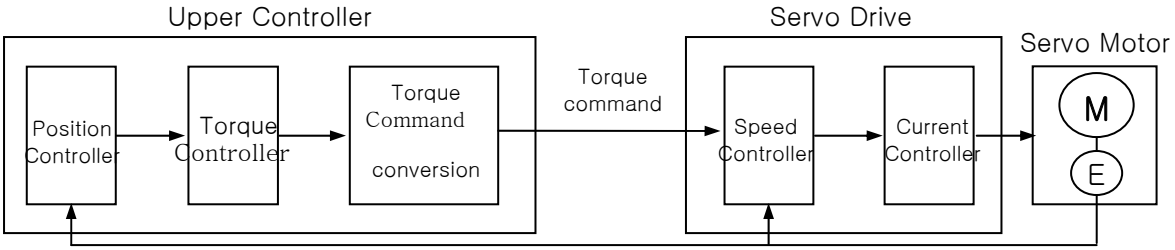
Strong point : Response of servo is fast.

Easy to control precisely

Weak point : Upper controller is complicate.

3) Torque Operation System

Operating Servo by torque command that is analog voltage.



Strength : Response of servo is fast.
Easy to control precisely

Weakness : Upper controller is complicate

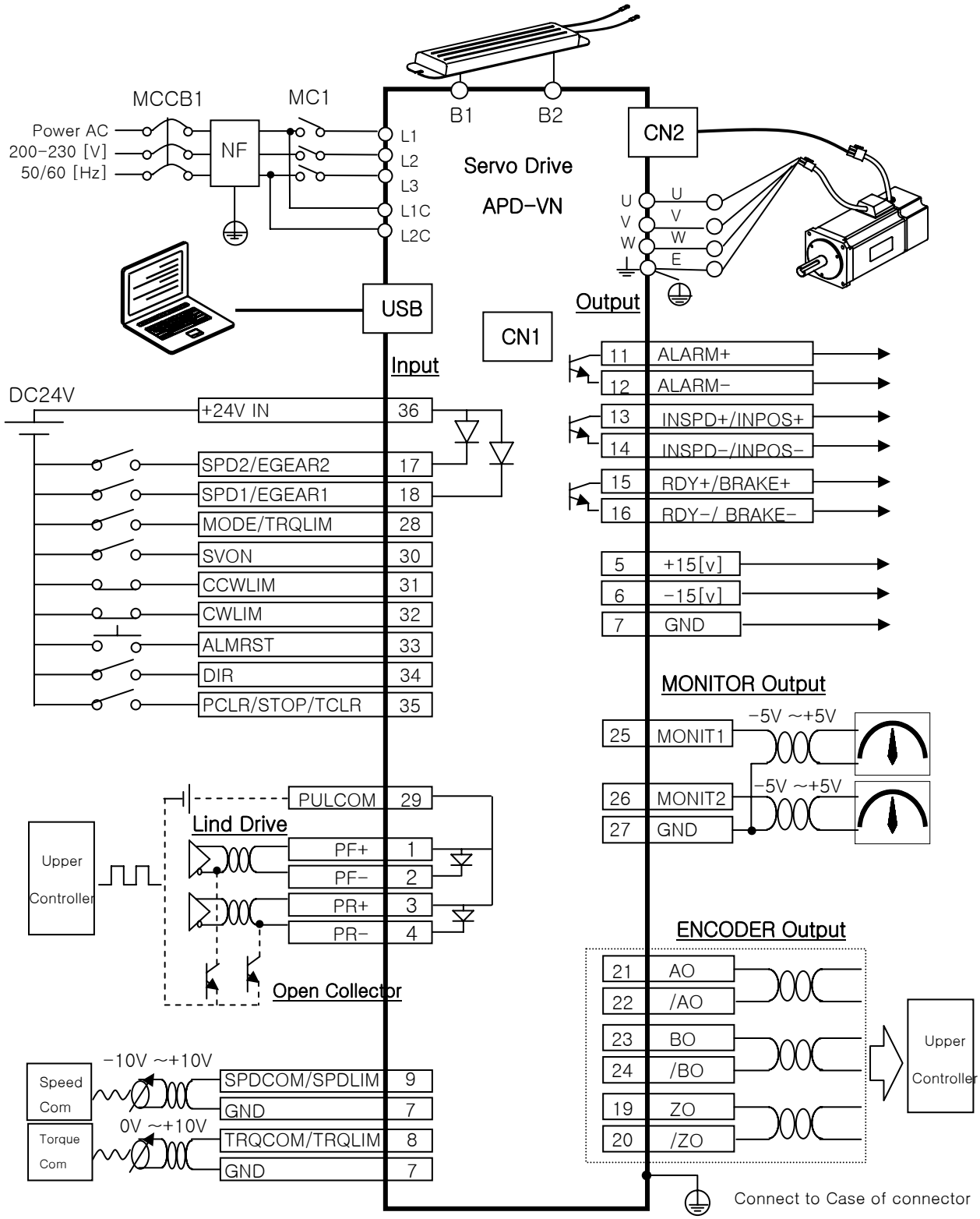
4) Operation mode

According to interface with upper controller, Operating mode is as below

Operation Mode	System
0	Operating Torque mode
1	Operating Speed mode
2	Operating Position mode
3	Operating Speed/Position mode by selecting connector
4	Operating Speed/Torque mode by selecting connector
5	Operating Position/Torque mode by selecting connector

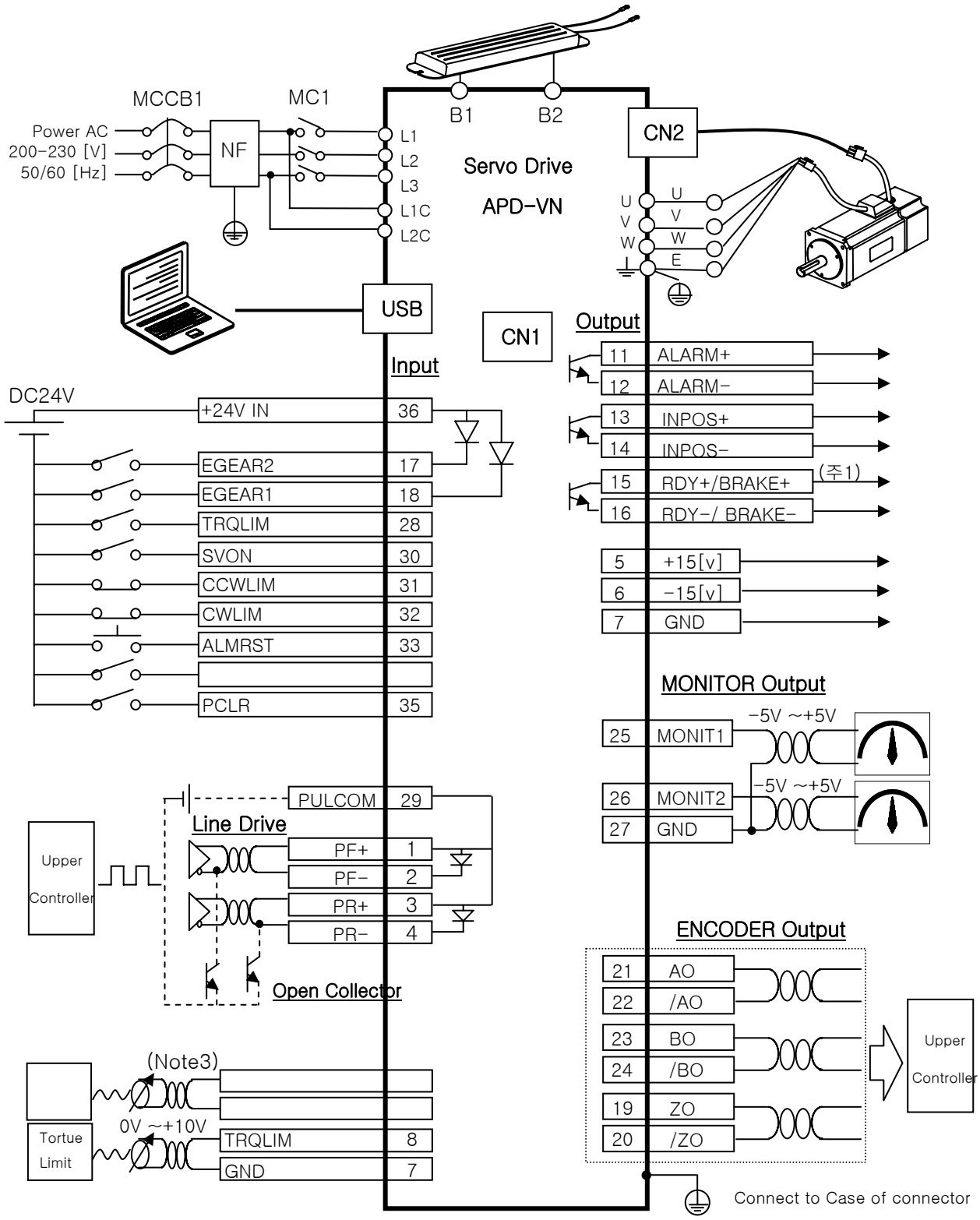
* Operation mode is set up on menu [PE-601]

1.2.2 Wiring


MCCB1
MC1
Power AC
200-230 [V]
50/60 [Hz]
NF
L1
L2
L3
L1C
L2C
B1
B2
Servo Drive
APD-VN
CN2
U
V
W
E
USB
CN1
Output
Input
DC24V
+24V IN 36
SPD2/EGEAR2 17
SPD1/EGEAR1 18
MODE/TRQLIM 28
SVON 30
CCWLIM 31
CWLIM 32
ALMRST 33
DIR 34
PCLR/STOP/TCLR 35
11 ALARM+
12 ALARM-
13 INSPD+/INPOS+
14 INSPD-/INPOS-
15 RDY+/BRAKE+
16 RDY-/ BRAKE-
5 +15[v]
6 -15[v]
7 GND
MONITOR Output
25 MONIT1
-5V ~+5V
26 MONIT2
-5V ~+5V
27 GND
Lind Drive
PULCOM 29
PF+ 1
PF- 2
PR+ 3
PR- 4
Upper Controller
Open Collector
ENCODER Output
21 AO
22 /AO
23 BO
24 /BO
19 ZO
20 /ZO
Upper Controller
-10V ~+10V
Speed Com
SPDCOM/SPDLIM 9
GND 7
0V ~+10V
Torque Com
TRQCOM/TRQLIM 8
GND 7
Connect to Case of connector

.

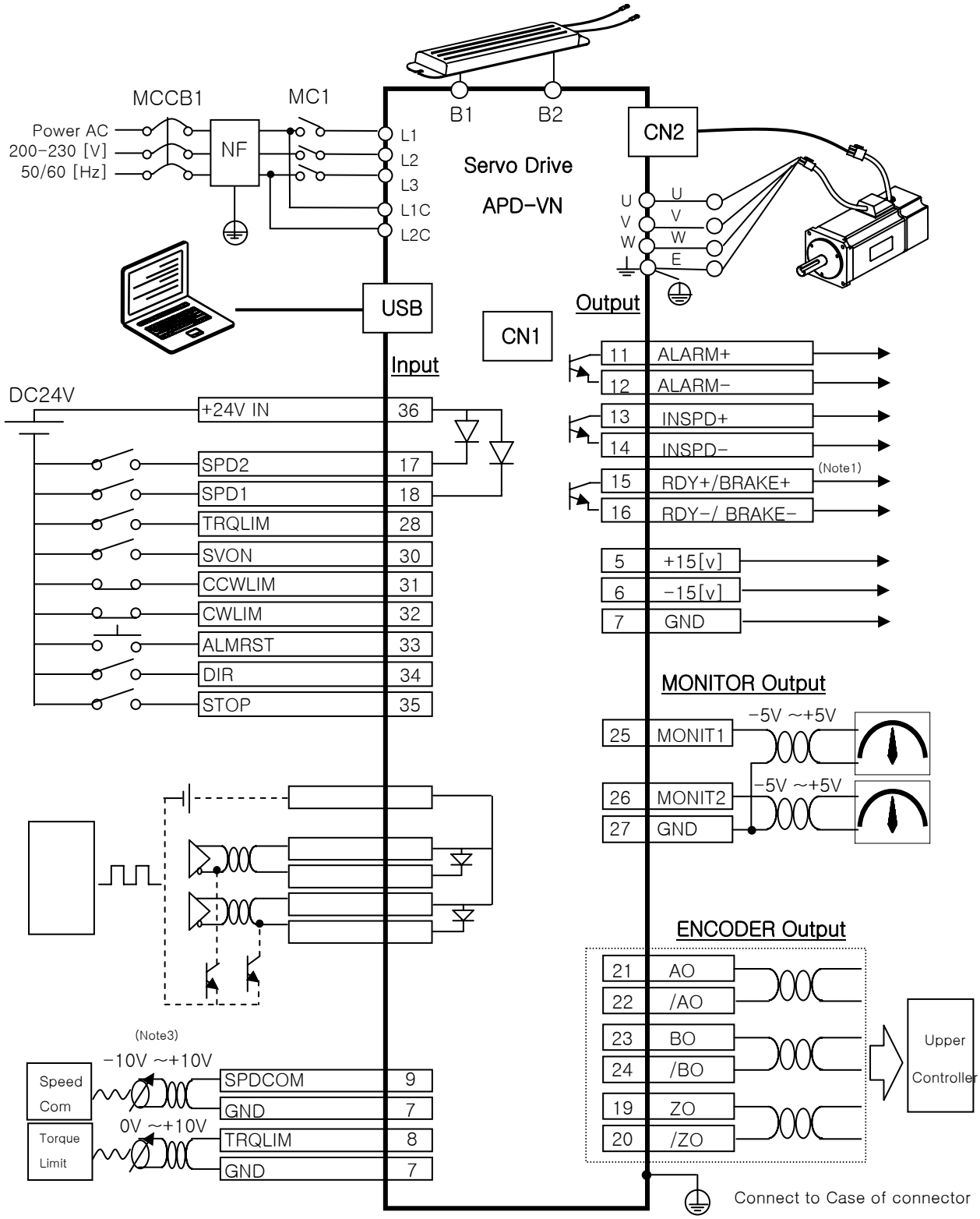
1.2.3 Position Operating Mode



Note1) RDY/ BRAKE Output contact signal : Select in [PE-508].

Note2) Surely use Twist pair shield cable for pulse command signal (PF+, PF-, PR+, PR-) and torque limit signal(TRQLIM).

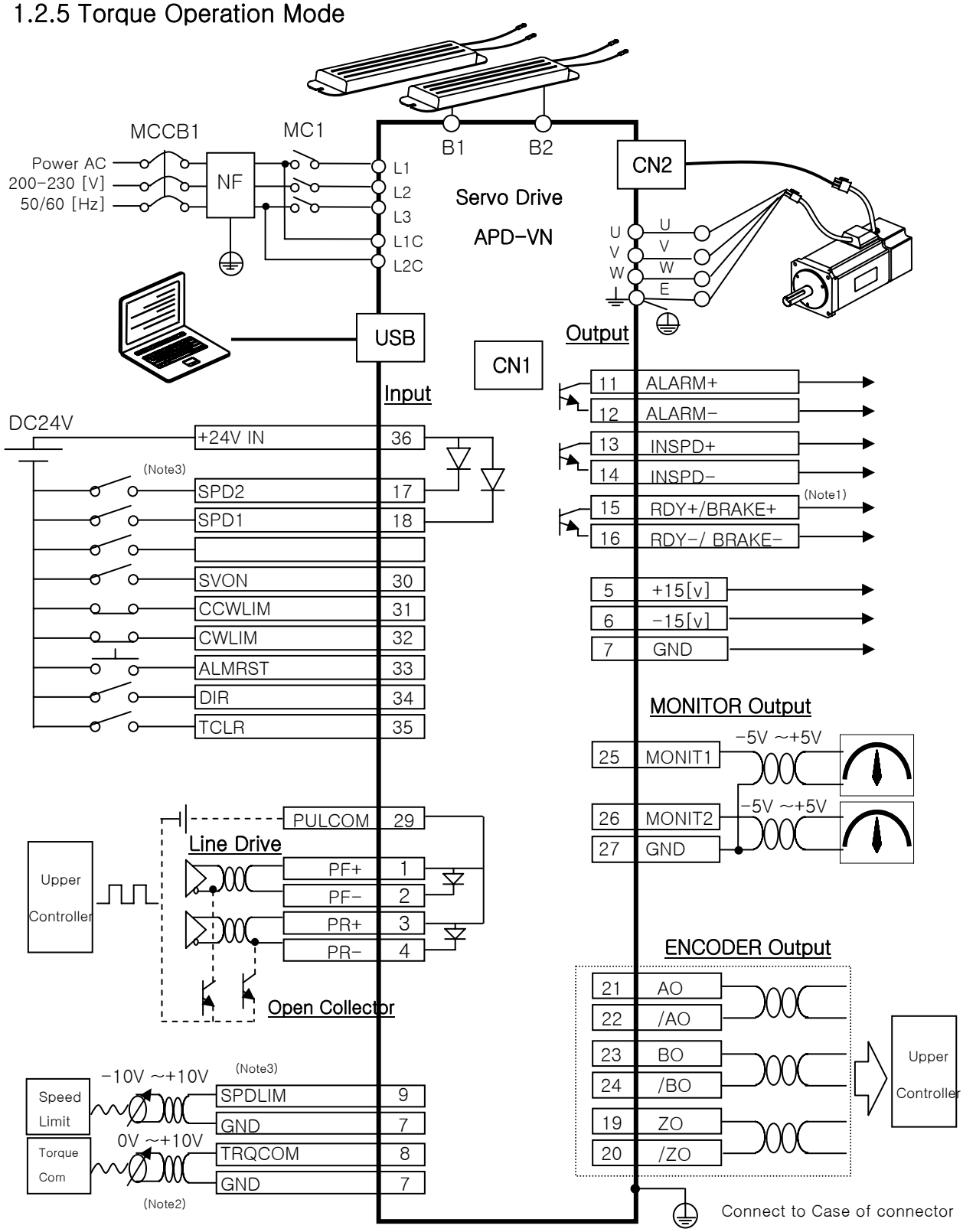
1.2.4 Speed Operation Mode



Note1) RDY/ BRAKE Output contact signal : Select in [PE-508].

Note2) Surely use Twist Pair shield cable for SPDCOM, TRQLIM, GND.

1.2.5 Torque Operation Mode

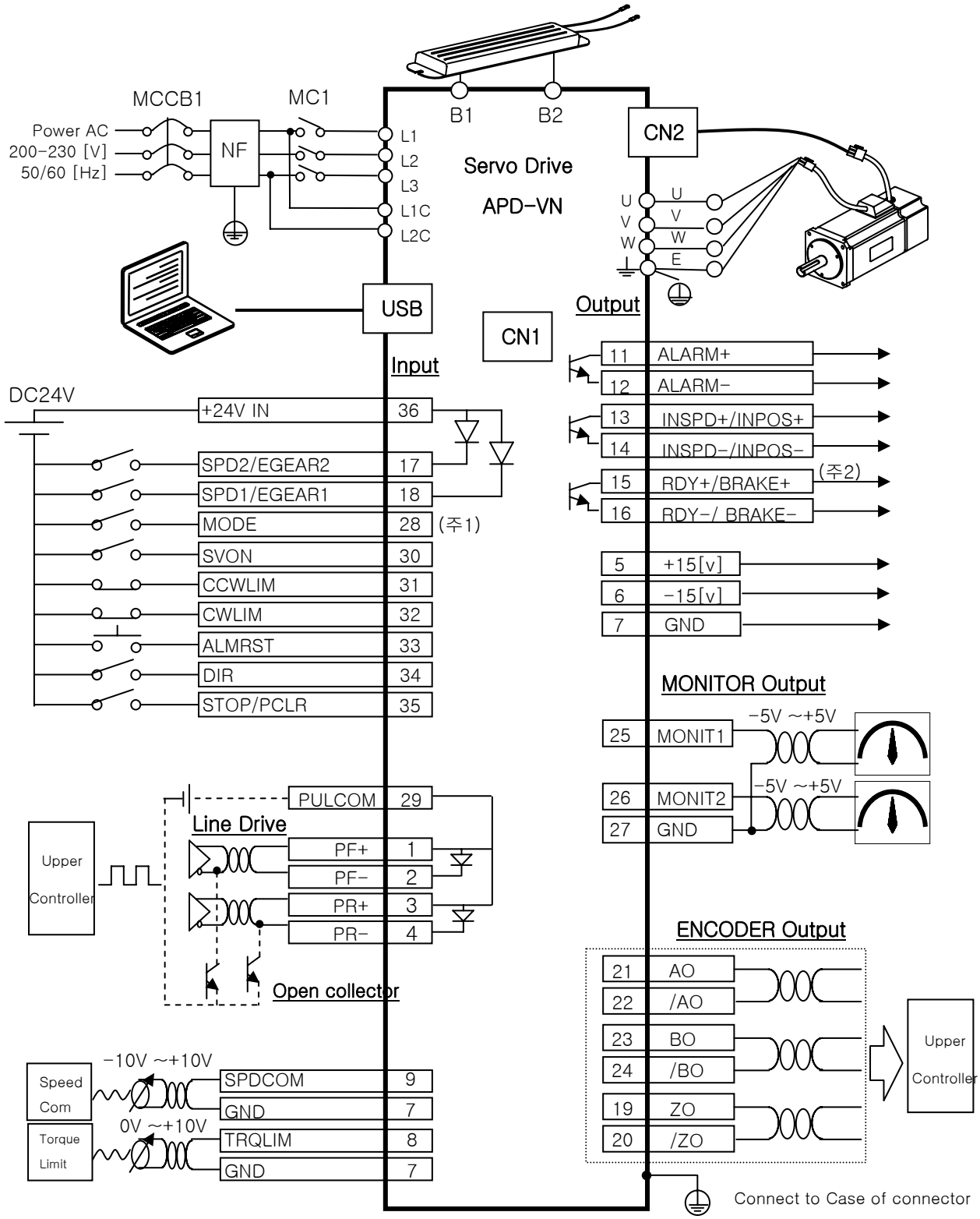


Note1) RDY/ BRAKE Output contact signal : Select in [PE-508].

Note2) Surely use Twist Pair shield cable for SPDCOM, TRQLIM, GND.

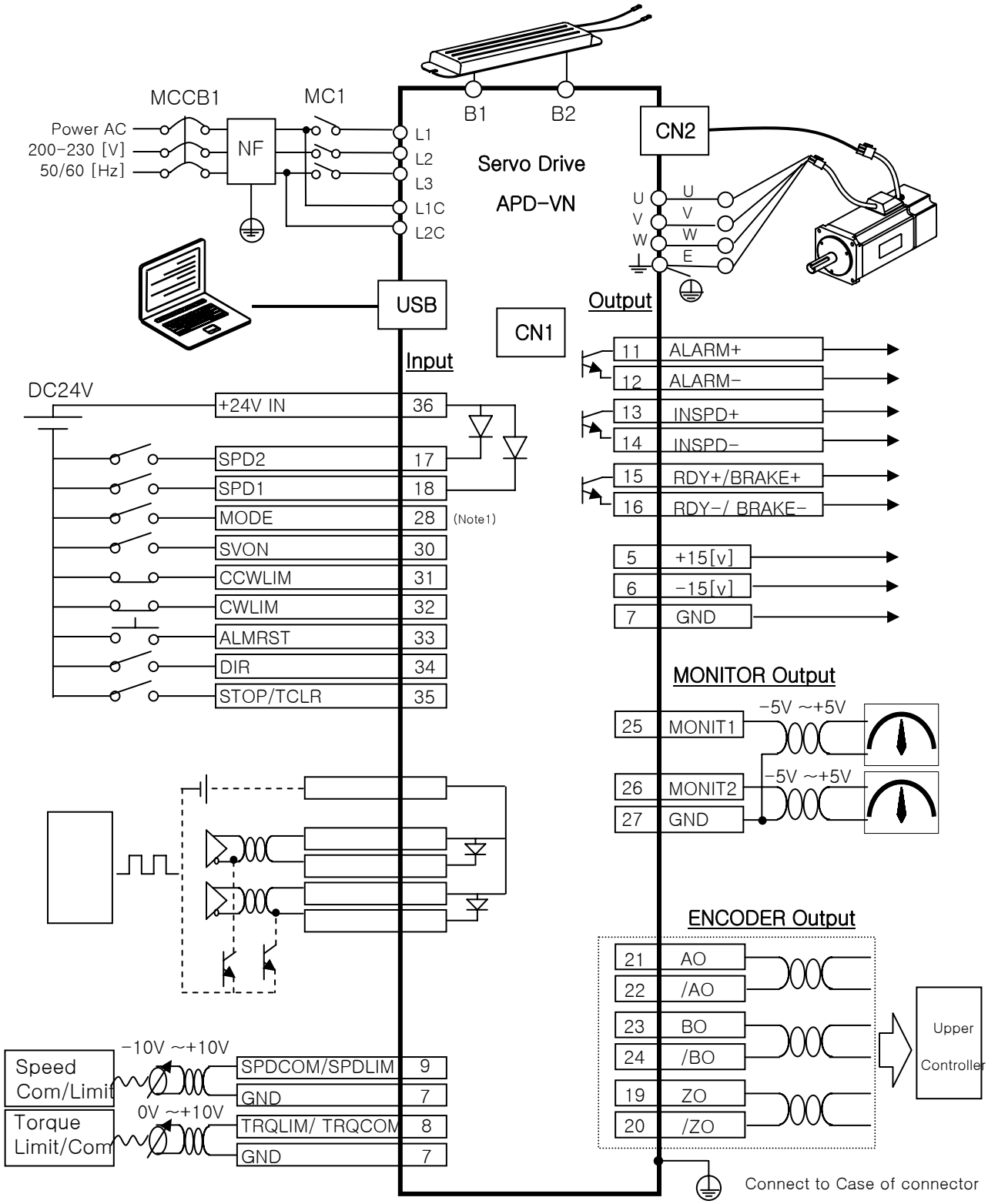
Note3) Surely set Speed limit type by SPDLIM, SP01, SP2D terminal.

1.2.6 Speed/Position Operation Mode



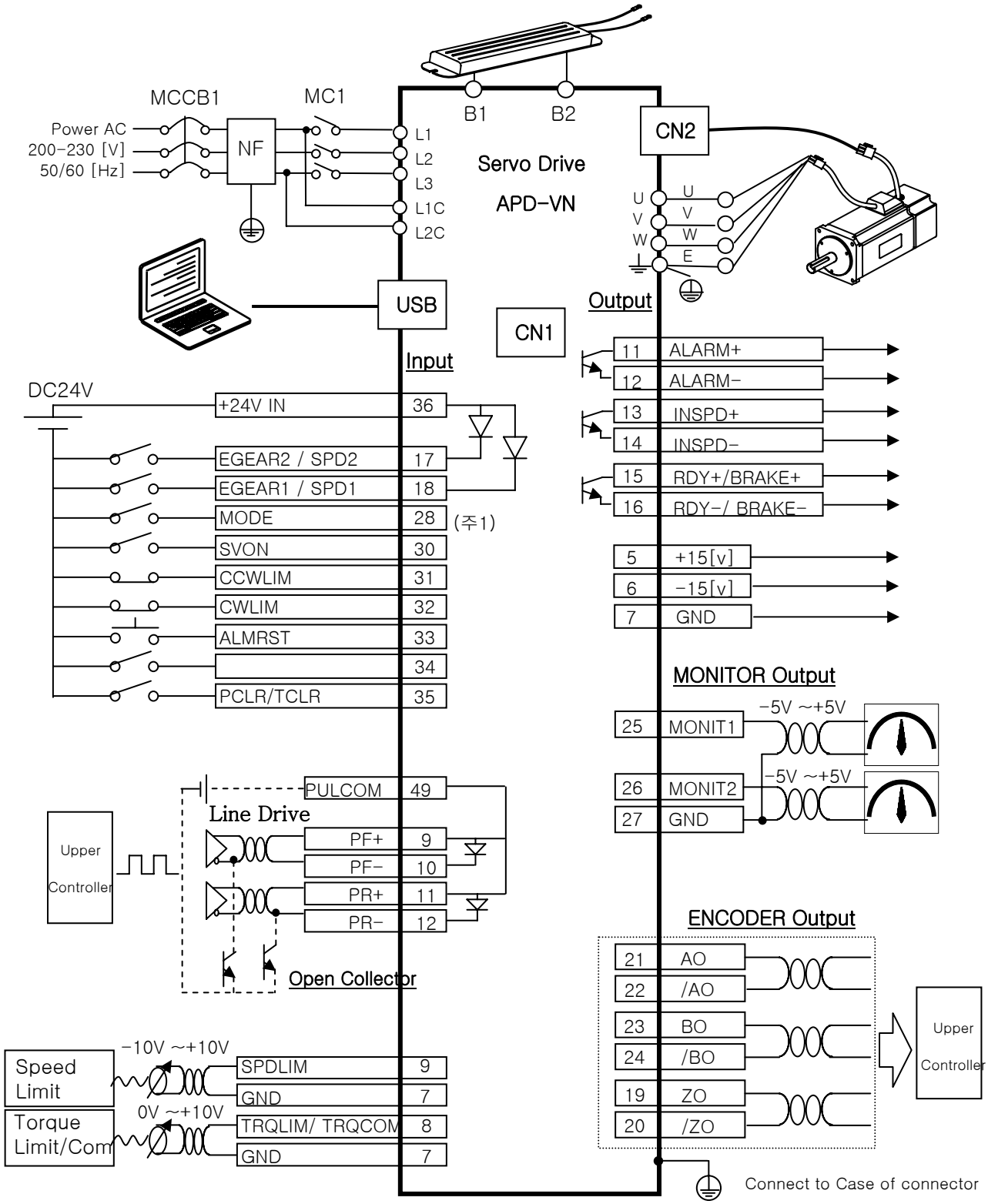
Note1)Input contact MODE=ON: Speed control mode, MODE=OFF: Position control mode

1.2.7 Speed/Torque Operation Mode



Note1) Input contact MODE=ON: Speed control mode, Mode=OFF: Torque control mode

1.2.8 Position/Torque Operation Mode



Note2)Input contact MODE=ON: Position control mode, MODE=OFF: Torque control mode

1.3 Signal Explanation

1.3.1 Input contacts signal

Pin No.	Name	Function and Use	Application table on operation mode					
			P	S	T	S/P	S/T	P/T
36	+24V IN	Input contact +24[V] power supply	O	O	O	O	O	O
17	SPD2	Selecting Speed Command2 / Selecting Speed limit2	X	O	O	O/X	O/O	X/O
	EGEAR2	Switching electronic gear ratio2	O	X	X	X/O	X/X	O/X
18	SPD1	Selecting Speed Command1 / Selecting Speed limit1	X	O	O	O/X	O/O	X/O
	EGEAR1	Switching electronic gear ratio1	O	X	X	X/O	X/X	X/O
28	MODE	ON: Switching control mode	X	X	X	O	O	O
	TRQLIM	ON : Torque limit by TRQLIM value OFF : Torque limit by parameter	O	O	O	X	X	X
30	SVON	ON: Servo Operating OFF: Motor free run	O	O	O	O	O	O
31	CCWLIM	Prohibit CWW rotating (forward direction)	O	O	O	O	O	O
22	CWLIM	Prohibit CW rotating (reverse direction)	O	O	O	O	O	O
33	ALMRST	RESET at ALARM	O	O	O	O	O	O
34	DIR	Selecting rotating direction	X	O	X	O/X	O/X	X/X
35	STOP /PCLR /TCLR	Motor Stop at Speed Control Motor Stop at Position Control Motor Stop at Torque Control	O	O	O	O	O	O

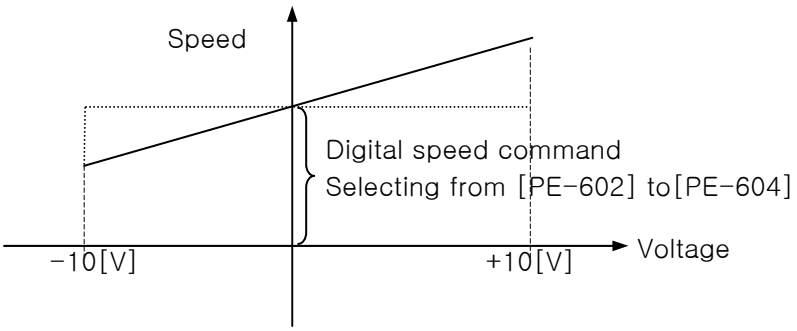
Note2) In case Speed operation, ‘DIR’ and ‘STOP’ contacts are operated as below by the menu [PE-514].

Set up [PE-514]	Operating Method					
	CCW		CW		CCW	
	DIR	STOP	DIR	STOP	DIR	STOP
0	OFF	OFF	ON	OFF	X	ON
1	OFF	ON	ON	OFF	ON	ON
					OFF	OFF

1.3.2 Analog Input Signal

Pin No.	Name	Function and Use	Application table on operation mode					
			P	S	T	S/P	S/T	P/T
9	SPDCOM	Analog speed command (-10~+10[V])	X	O	X	O/X	O/X	X/X
	SPDLIM	Analog speed limit input (0~+10[V])	X	X	O	X/X	X/O	X/O
8	TRQCOM	Analog torque command input (-10~+10[V])	X	X	O	X/X	X/O	X/O
	TRQLIM	Analog torque limit input (0~+10[V])	O	O	X	O/X	O/X	O/X
7	GND	Analog Signal ground	O	O	O	O	O	O

* On Analog speed command, In case of override speed operation (set up as “1” on menu[PE-405]), operation is executed by speed command that is repeated on digital speed command.



1.3.3 Pulse Input Signal

Pin No.	Name	Function and Use	Application table on operation mode					
			P	S	T	S/P	S/T	P/T
1	PF+	Line drive(5V) : F+ pulse input Open collector(24V) : Not Used	O	X	X	X/O	X	O/X
2	PF-	Line drive(5V) : F- pulse input Open collector(24V) : F pulse input	O	X	X	X/O	X	O/X
3	PR+	Line drive(5V) : R+ pulse input Open collector(24V) : Not Used	O	X	X	X/O	X	O/X
4	PR-	Line drive(5V) : R- pulse input Open collector(24V) : R pulse input	O	X	X	X/O	X	O/X
29	PULCOM	Line drive(5V) : Not Used Open collector(24V) : +24V Power supply input	O	X	X	X/O	X	O/X

1.3.4 Output Contacts Signal

Pin No.	Name	Function and Use	Application table on operation mode					
			P	S	T	S/P	S/T	P/T
11/ 12	ALARM+/-	ALARM state output ON : normal state OFF : ALARM state	O	O	O	O	O	O
13/ 14	INSPD+/-	Output complete signal of target speed reaching	X	O	X	O/X	O/X	X/X
	INPOS+/-	Output complete signal of target position reaching	O	X	X	X/O	X/X	O/X
15/ 16	RDY+/-	ON at Complete operating ready state	O	O	O	O	O	O
	BRAKE+/-	Brake operating signal output (ON at servo dirving)	O	O	O	O	O	O

1.3.5 Monitor Output Signal and Output Power Supply

Pin No.	Name	Function and Use	Application table on operation mode					
			P	S	T	S/P	S/T	P/T
25	MONIT1	Analog monitor output1(-5~+5[V])	O	O	O	O	O	O
26	MONIT2	Analog monitor output2(-5~+5[V])	O	O	O	O	O	O
27	GND	Analog output signal ground	O	O	O	O	O	O
5	+15V	+15[V]Power supply output terminal	O	O	O	O	O	O
6	-15V	-15[V]Power supply output terminal	O	O	O	O	O	O
7	GND15	Ground of operation power(15V)	O	O	O	O	O	O

1.3.6 ENCODER Output Signal

Pin No.	Name	Function and Use	Application table on operation mode					
			P	S	T	S/P	S/T	P/T
21 22 23 24	AO /AO BO /BO	Divide the Encoder signal by set values of menu [PE-501], [PE-511] (5[V] Line drive type)	O	O	O	O	O	O
19 20	ZO /ZO	Encoder Z signal output by motor (5[V] Line drive type)	O	O	O	O	O	O

Chapter 2

Installation

2.1 Servo Motor

2.1.1 Working circumstances…… 2-2
2.1.2 Avoiding excessive shock …… 2-2
2.1.3 Wiring …… 2-2
2.1.4 Connecting with load equipment…… 2-3
2.1.5 Installing cable …… 2-3

2.2 Servo Drive

2.2.1 Working circumstances …… 2-4
2.2.2 Installing in a control board(panel)…… 2-5
2.2.3 Wiring …… 2-6

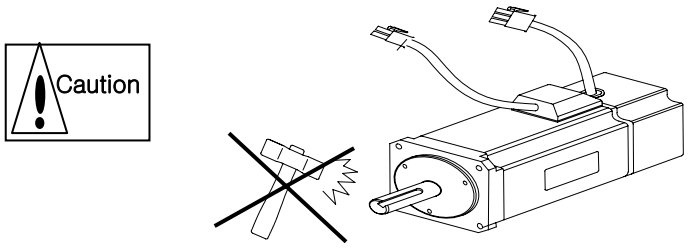
2.1 Servo Motor

2.1.1 Working circumstances

Item	Working circumstances	Remarks
Temp.	0～40[℃]	In case that the temperature exceeds the fixed range, you have to check with the R&D Dept. and place an order separately
Humidity	Less than 80[%]RH	No vapor
External vibration	Vibration accel.speed Less than X, Y direction 19.6[㎨]	Excessive vibration can shorten the life of bearing

2.1.2 Avoiding excessive shock

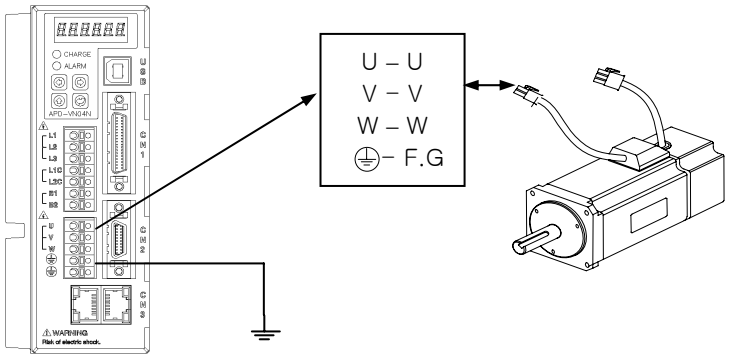
-In case that you shock the motor shaft or drop it, the encoder can be broken



2.1.3 Wiring

-If you apply common power to the motor directly, the motor can be damaged so you have to connect it to the proper drive

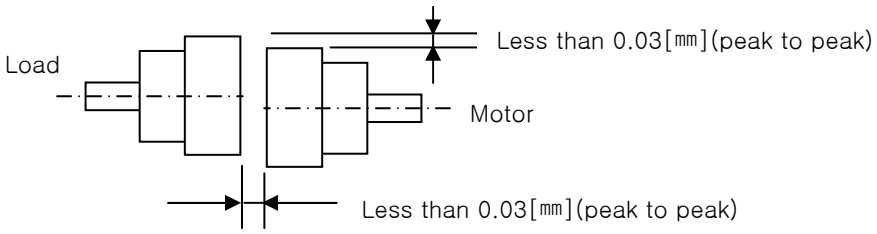
- The grounding terminal of the motor should be connected to one of two grounding terminal of drive and please connect the other with the 3 kinds of grounding



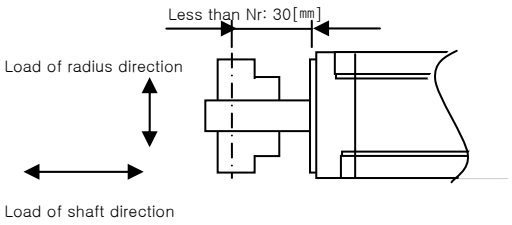
- The terminal, U,V,W of the motor should be consisted with the U, V,W of the drive.
- Please check the missing connector pin of the motor and bad connection
- In case that there is humidity or condensation in the motor, you have to check the insulation resistor is more than 10[㏁](500[V]) after installation

2.1.4 Connecting with load equipment

- Connection with coupling : Install the motor shaft and load shaft within the allowed ranged

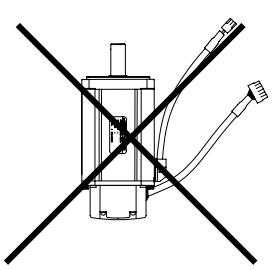


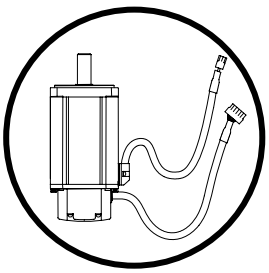
- Connecting with pulley:

Flange	Load of Radius direction		Load of shaft direction		Remarks
	N	kgf	N	kgf	
40	148	15	39	4	
60	206	21	69	7	
80	255	26	98	10	
130	725	74	362	37	
180	1548	158	519	53	
220	1850	189	781	90	

2.1.5 Installing cable

- In case of vertical installation, don't let the oil or water flow into the connection part





- Don't damage or scratch the cable.

In case that the motor moves, you have to use the flexible cable and don't let the cable be waved.

2.2 Servo Drive

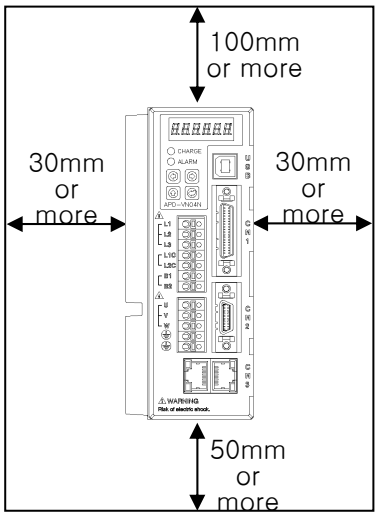
2.2.1 Working circumstances

- The working circumstances should meet the below requirements

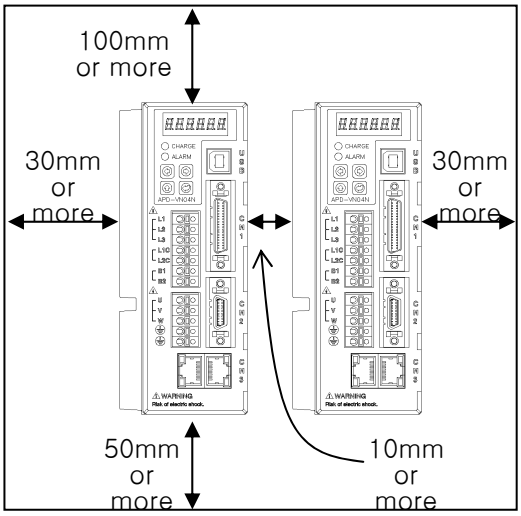
Item	Circumstances	Remarks
Temp.	0～50[℃]	Caution Attach the fan to the panel for ventilation within the allowed temp.
Humidity	Less than 90[%]RH	Caution In case of long stoppage, the moisture which is generated from freezing and condensation can damage the drive. When you run the motor after long stoppage, you have to remove the moisture thoroughly
External Vibration	Vibration accel. speed Less than 5.9[㎨]	Excessive vibration can shorten the life and cause malfunction
Conditions	- No direct ray of light - No corrosive e or inflammable gas - No oil or dirt - Good Ventilation in airtight place	

2.2.2 Installing in a control board (panel)

-Refer to the below for installation gap in a control board



In case of 1 unit



In case of 2 units

Note 1) Don't let the Installed regenerative resistor affect the drive such as generating heat.

Caution

- When you assemble a control board, don't let the metal dust which is generated by drill into the drive
-Prevent the oil, water, metal dust flowing into the break or roof
- Please protect a control board with air paper under the circumstance which has much noxious gas and dust

2.2.3 Wiring

- Check the voltage of input power and let it be within

Caution

- Perform alarm rest after removing the main factors and turning the SVON off

- If you apply the common power to the terminal U,V,W of the drive, it can be damaged
  So please connect the power to L1, L2, L3 terminals
- The regenerative resistor which is connected to the drive B1, B2 should be standard value

Model	Resistor	Standard capacity	* Remarks
VN01~VN04	100[Ω]	Built-in 30[W]	Caution Refer to the "7.3. Options/ Surroundings when you try to expand the capacity of regenerative resistor
VN07~VN10	40[Ω]	Exterior 140[W]	
VN15~VN20	23[Ω]	Exterior 300[W]	
VN35	11.5[Ω]	Exterior 300[W] ×2	

- Apply the main power (L1, L2, L3) after providing control power (L1C, L2C)
  (Refer to "Chapter 3 Wiring)
- Please be noted that there will be high voltage for a while even after cutting off the main power

Caution

To avoid electric shock, try to wire again after cutting off the main power and checking if the CHARGE lamp was turn off entirely

- Select the shortest distance for grounding
  The long grounding line can cause malfunction due to noise

Chapter 3

Wiring

3.1 Internal Block Diagram

3.1.1 Block Diagram (Rated Output is less than 400[W]) ·····3-2

3.2 Power Board Wring

3.2.1 Wiring Diagram (Rated Output is less than 400[W])····· 3-3

3.2.2 Power Board Part specification ····· 3-4

3.3 Timing Diagram

3.3.1 Timing diagram at power supply····· 3-5

3.3.2 Timing diagram at Alarm occurred····· 3-6

3.4 Wiring control Signal

3.4.1 Contact input signal ····· 3-7

3.4.2 Contact output signal····· 3-7

3.4.3 Analog I/O signal ····· 3-8

3.4.4 Pulse input signal ····· 3-9

3.4.5 Encoder output signal ····· 3-10

3.5 Incremental Encoder Signal (CN2) Wiring

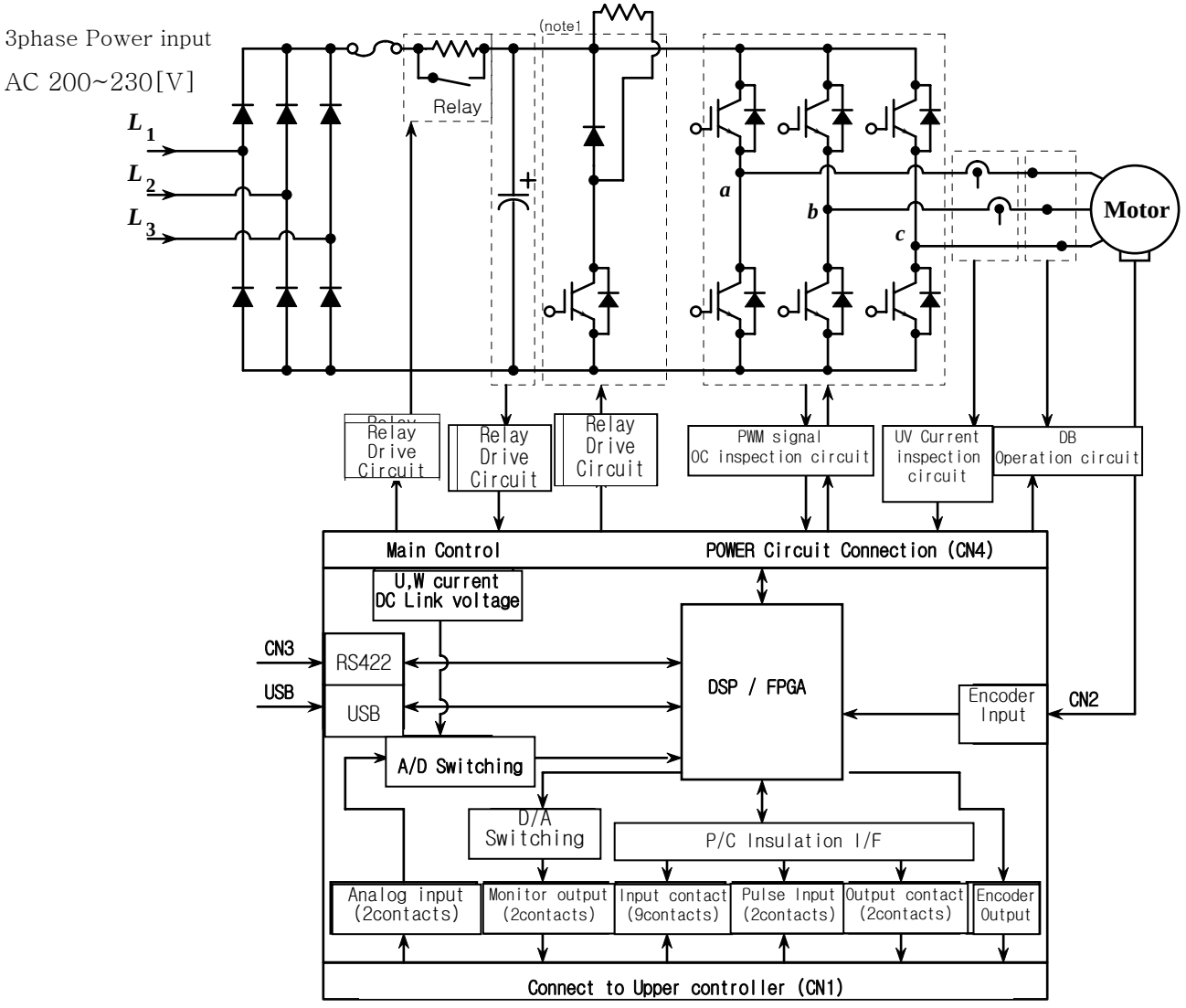
3.5.1 Small-size Motor ····· 3-11

3.5.2 Medium/Large-Size Motor ····· 3-11

3.1 Internal Block Diagram

3.1.1 Block Diagram (Rated Output is less than 400[W])

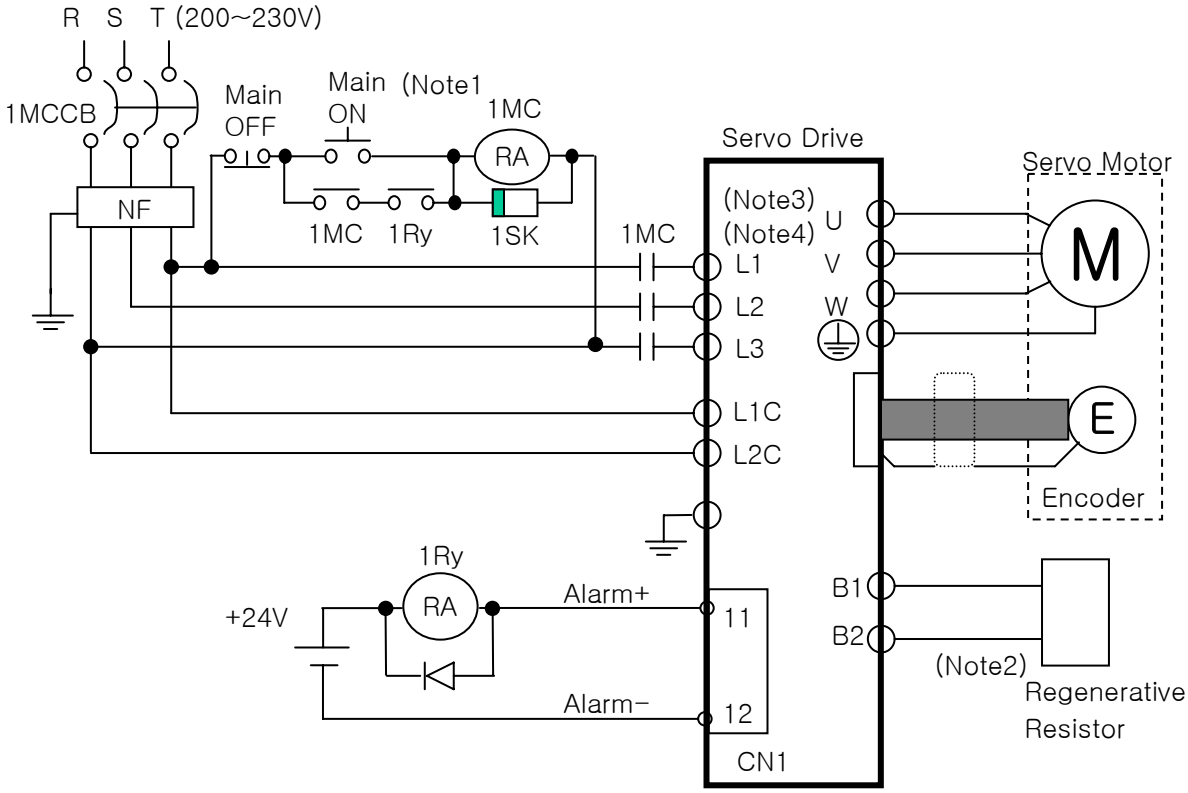
[APD-VN01 ~ APD-VN04]



(Note1) B1-B2 short pin and Regenerative resistor is installed in ONLY APD-VN04 Type

3.2 Power Board Wiring

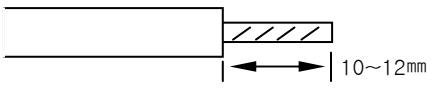
3.2.1 Wiring (Rated output is less than 400[W])
[APD-VN01 ~ APD-VN04]



(Note1) It takes approximately 1~2 seconds before alarm signal is activated after power is connected.
Press main power on switch for at least 2 seconds of longer.

(Note 2): B1-B2 short pin and regenerative resistor(30[W], 100[Ω]) is installed in APD-VN04 Type
(But, there are no regenerative circuit and regenerative resistor in APD-VN01, VN02 type)
In case of regenerative capacity is large due to frequent acceleration / deceleration.
At this time, Make sure that the optional Brake resistor should be big size resistor.

(Note 주 3) For the electric wire that is to be used at Main circuit power board, strip the coating of wire about 10~12[㎜] as below and use the exclusive terminal which is Ferule UA-F1512 (Made by Suh-il Electronics).



(Note 4) Connect or remove the wiring of main circuit power board after press the button (⏢) of terminal.

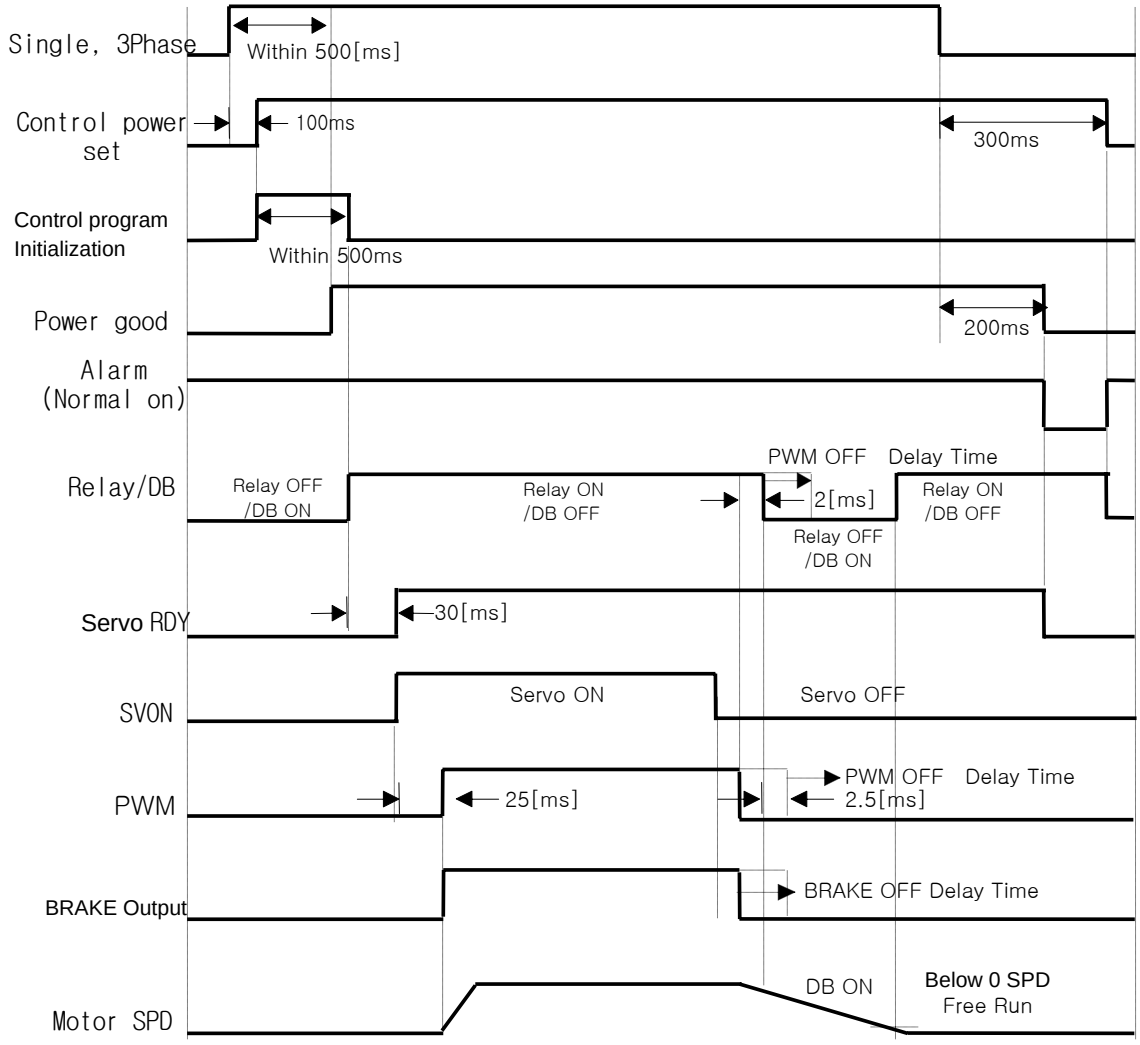
3.2.2 Power circuit parts specification

Type	01	02	04	07	10	15	20	35
MCCB	ABS33bM(8A)			12A		16A	24A	
NF(Noise Filter)	NFZ-410SM					415SM	420SM	430SM
MC	GMC-9(11A) equivalent			GMC-18(18A)			GMC-40(35A)	
Power Wire	AWG16 (1.25 SQ)			AWG14 (2 SQ)		AWG12 (3.5 SQ)		AWG10 (5.5 SQ)
Compressed terminal	UA-F1512,SEOIL (10mm Strip&Twist)			GP110012 KET		GP110721 KET		GP110028 KET
Regenerative resistor (Provided)	–		30[W] 100[Ω]	140W 40Ω		300W 23Ω		300W 23Ω×2P

3.3 Timing Diagram

3.3.1 Timing diagram at power supplied

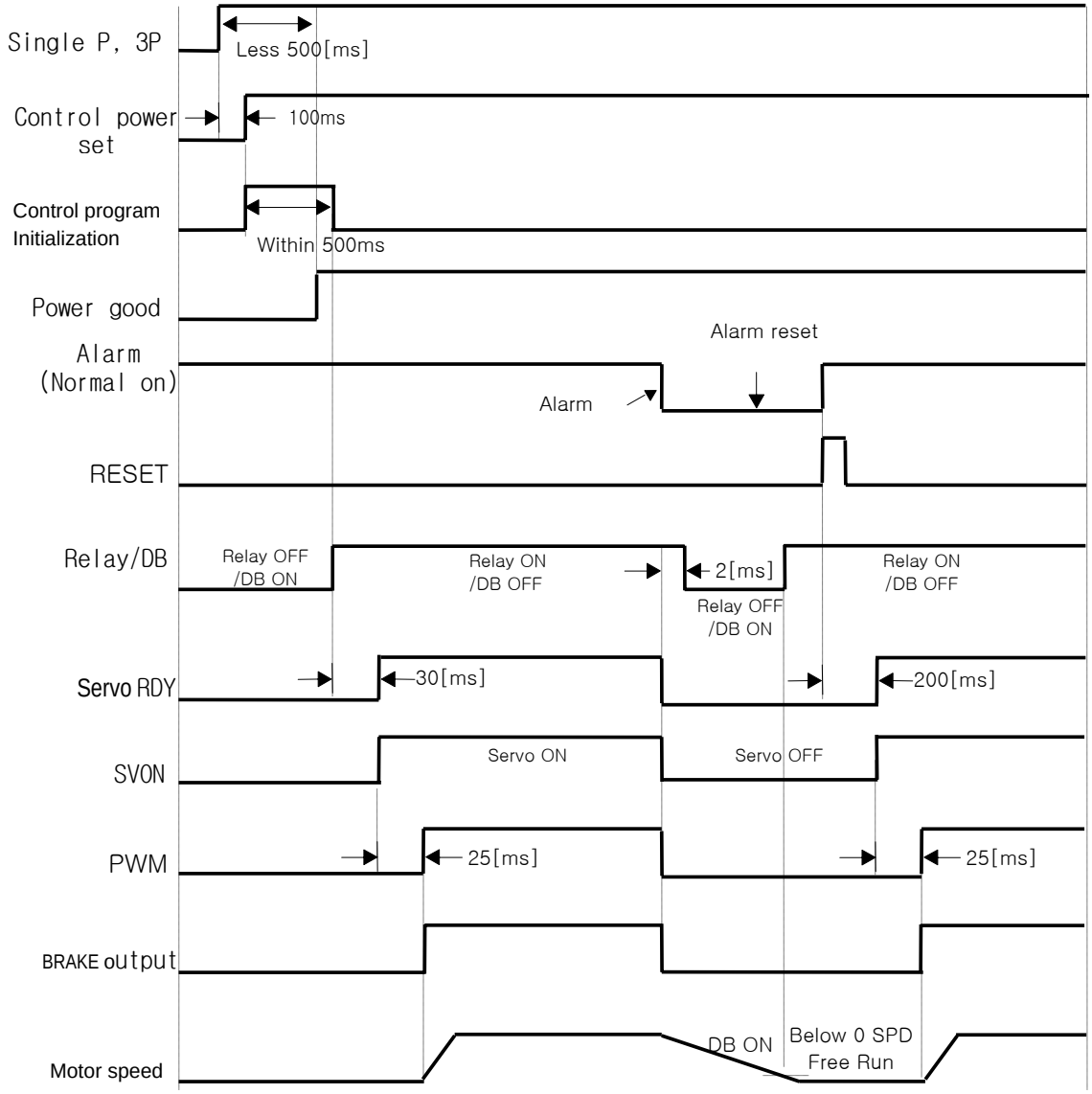
In the case of APD-VN01~VN04, Power is supplied to the control circuit if 3-phase power is connected to the L1, L2, L3 terminals.
Servo becomes RDY after maximum 500[msec] that is required to initialize the drive system inside,
In case of this after Relay off 30[ms] Servo becomes RDY.
and when the servo drive signal is turned ON, operation starts 25[msec] later.



3.3.2 Timing diagram at Alarm occurred

If Alarm occurred in the drive system, PWM is shut off and the motor stops.

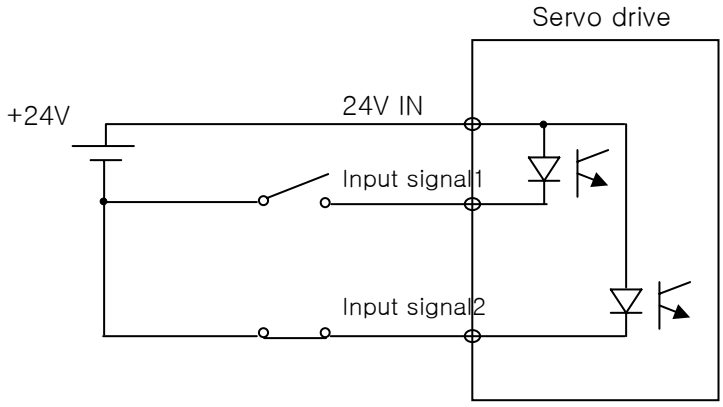
> CAUTION – Check and remove causes of Alarm and turn OFF the servo motor operating command (SVON) before resetting Alarm.



3.4 Wiring of Control Signal

3.4.1 Input Contact Signal

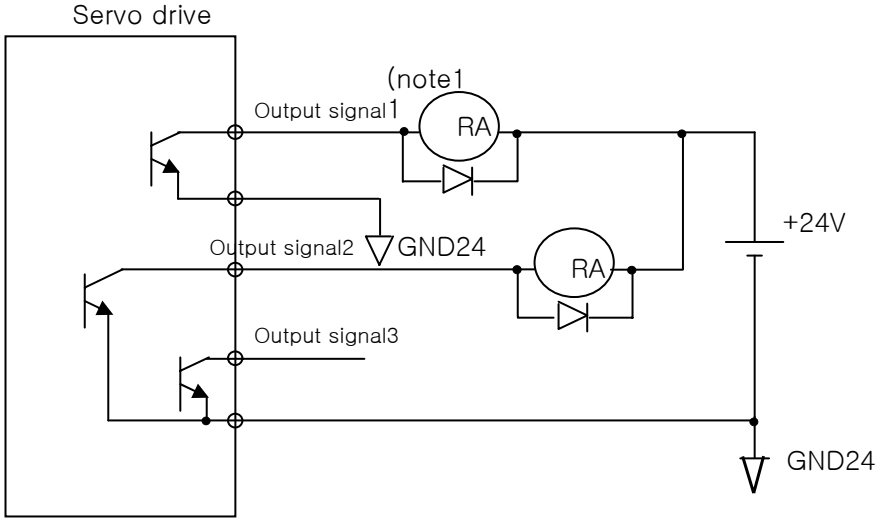
CAUTION The input contacts are classified into A contact and B contact depending on the contact characteristics and can be reset by the menu [PE-517], [PE-518] And special caution is required because each contacts can forcibly be ON/OFF.



3.4.2 Output Contact Signal

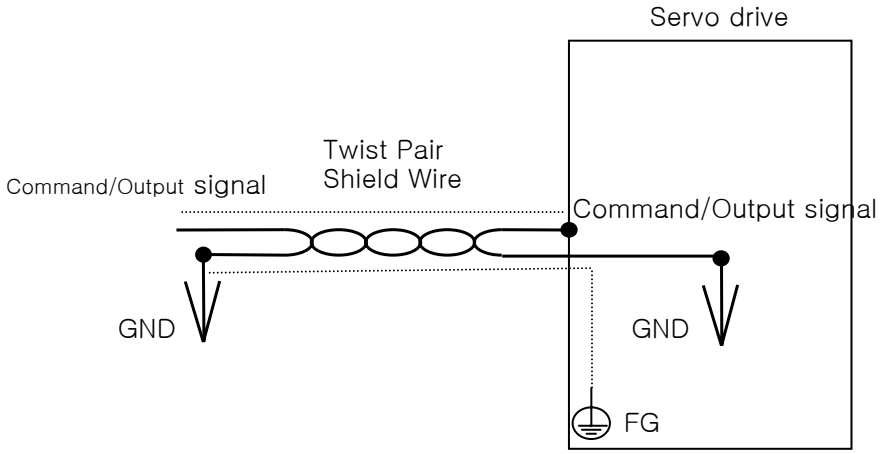
CAUTION The output contact internally uses transistor switch. Take precaution because over voltage or over current may cause damage to the system.

- Power supply: DC24[V]±10%, 150[mA]



(note1)For the output signal of Alarm and Ready, the GND24 terminal is separated

3.4.3 Analog I/O Signal



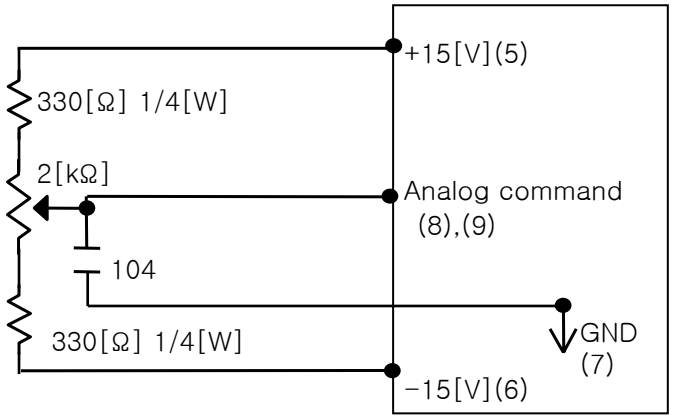
① GND terminal must be 0[V] of the control power supply.

② Input signal command voltage is within ±10[V], and input impedance is 20[㏀].

③ Output signal voltage of Monitor1(No.25), Monitor2(No.26) is ±5[V].

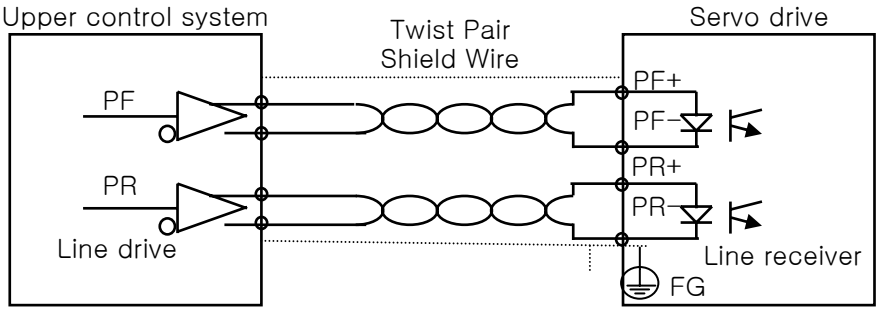
Addition to this, when controlling analog input by variable resistance using offered power by drive, wiring is as under. The output capacity of this power is 30[㎃] at maximum.

Do not exceed this capacity.

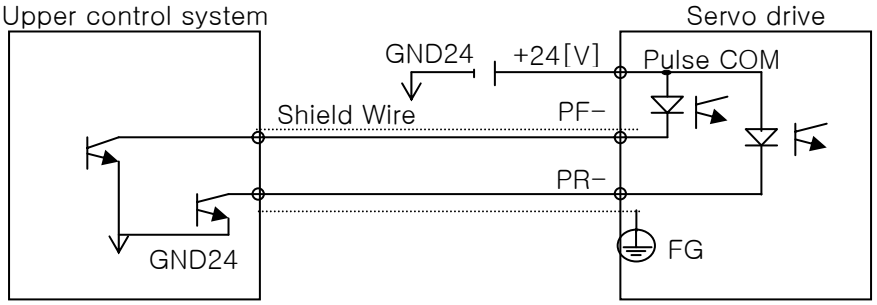


3.4.4 Pulse Input Signal

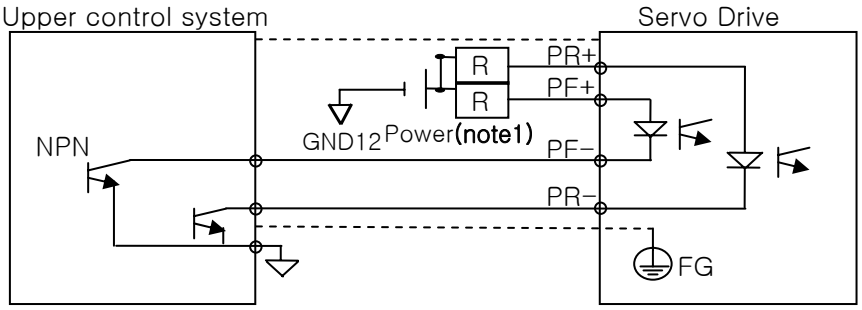
(1) Line Driver(5[v])Pulse input.



(2) Open collector (24[V]) Pulse input

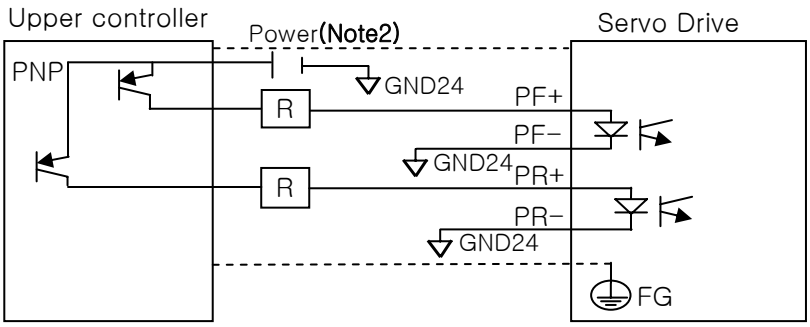


(3) NPN Open Collector Pulse command 12[V] or 5[V]



(Note1) When the power supply 12[V] is used: Resistance R=560~680[ohm], 1/2W
When the power supply 5[V] is used: Resistance R=100~150[ohm], 1/2W
When the power supply 24[V] is used: Resistance R=1.5[ohm], 1/2W

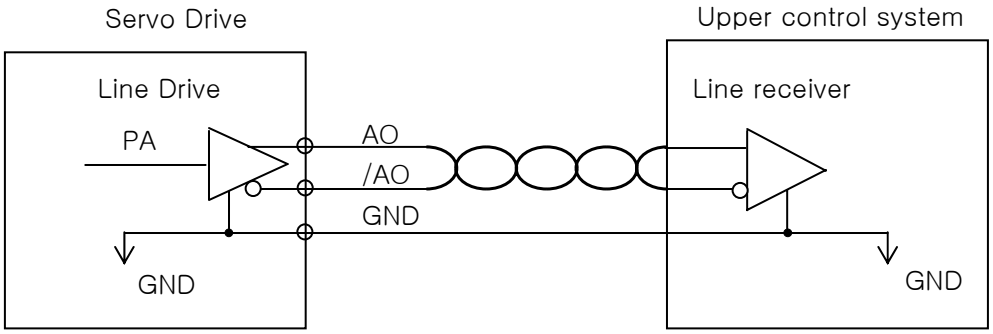
(4) PNP Open Collector type pulse command



(Note 2) When the power supply 24[V] is used: Resistance R=1.5[kohm], 1/2W
When the power supply 12[V] is used: Resistance R=560~680 [ohm], 1/2W
When the power supply 5 [V] is used: Resistance R=100~150[ohm], 1/2W

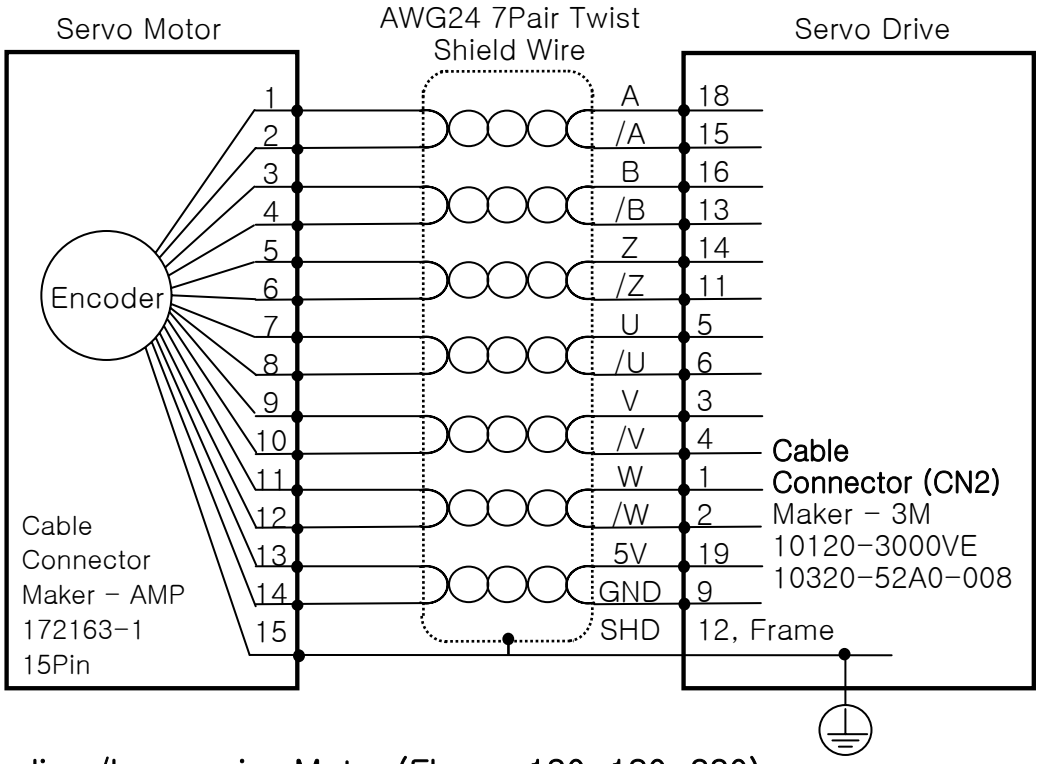
3.4.5 Encoder Output Signal

The encoder signal is produced based on 0[V] (GND) of control power supply.
So please contact 0 [V] terminals and GND of CN1 at Upper controller.
Encoder signal is produced in line drive system after the AC servo motor encoder signal received
From CN2 is divided according to the frequency dividing ratio set by the menu
[PE-510] [PE-511] (Pulse Out Rate).

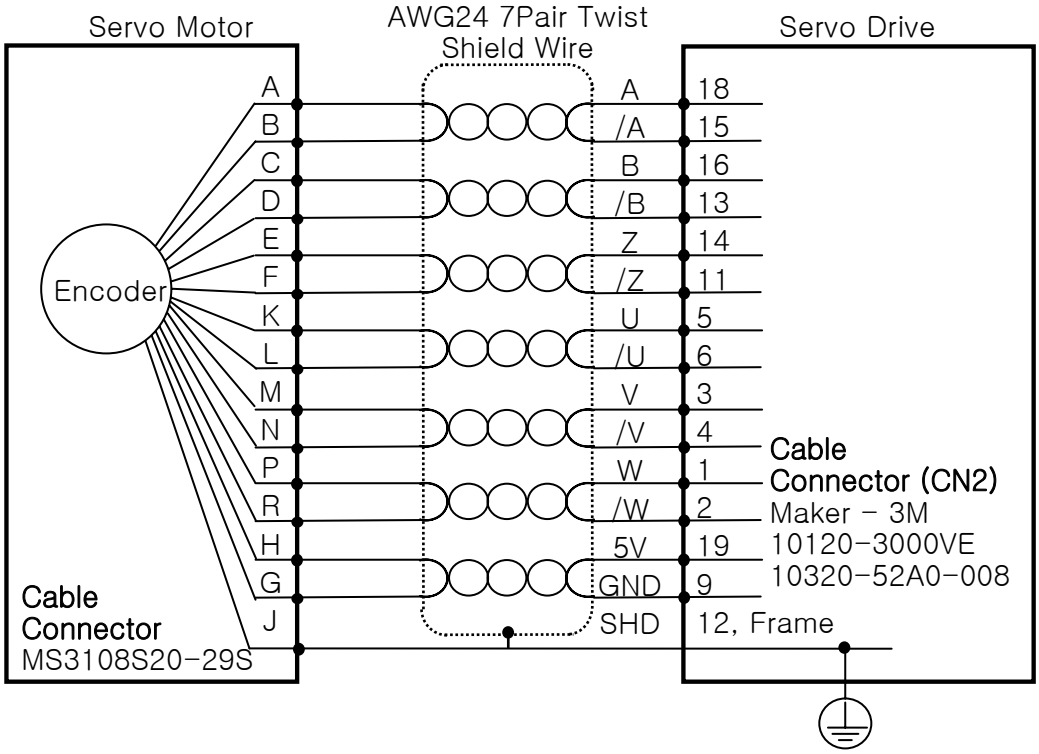


3.5 Wiring of Incremental Encoder Signal (CN2)

3.5.1 Small-size Motor (Flange 40, 60, 80)



3.5.2 Medium/Large-size Motor (Flange 130, 180, 220)



Chapter 4

Menu Operation

4.1 Loader Operation

4.1.1 Name of Each Part ····· 4-2

4.1.2 Menu Operation ····· 4-2

4.2 Menu Operation

4.2.1 Menu Summary ····· 4-4

4.2.2 Operation state indicating Menu ····· 4-5

4.2.3 Alarm state indicating Menu ····· 4-9

4.2.4 System Variables Setting Menu ····· 4-10

4.2.5 Control Variables Setting Menu ····· 4-13

4.2.6 Analog I/O Variables Setting Menu ····· 4-21

4.2.7 I/O Contacts Variables Setting Menu ····· 4-26

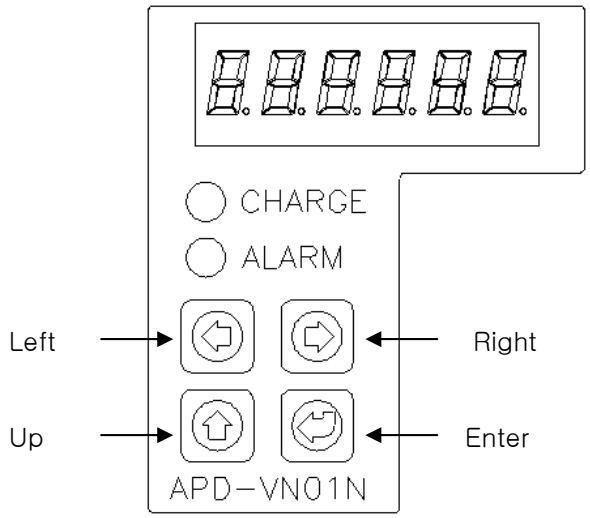
4.2.8 Speed Operation Variables Setting Menu ····· 4-32

4.2.9 Potion Operation Variables Setting Menu ····· 4-35

4.2.10 Operation Menu ····· 4-38

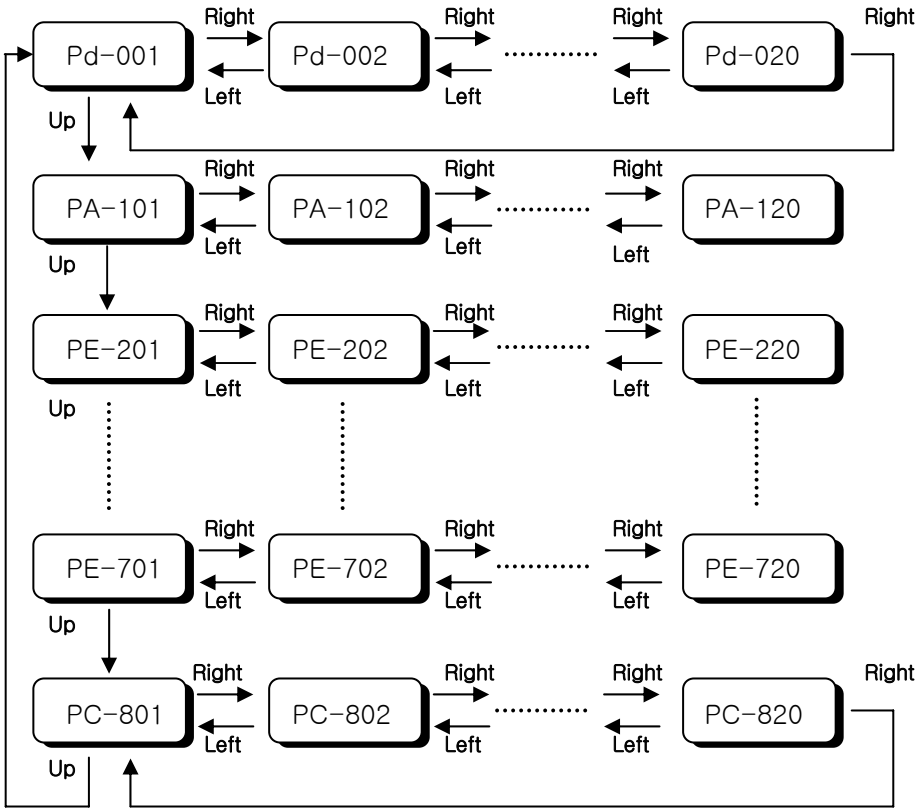
4.1 Loader Operation

4.1.1 Name of Each Part

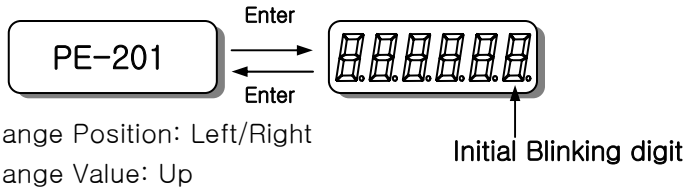


4.1.2 Menu Operation

① Logic of Menu



② Menu Editing



* Change Position: Left/Right
* Change Value: Up

- Shift to the menu for editing in the same method of ①
- After above, press[Enter] Key, then data of menu is displayed " 13 "
  And, the last digit is blinking ; you can change the value where blink is located.
- For moving the blinking position, press [Left] or [Right].
- For changing value, press [Up] Key, then value is increased. At this time, the numerical value turns back to "0" when it exceeds "9".
- When editing is completed, press [Enter] Key, then value is saved and return to menu.

※ When return to Menu without saving the value Press [Left], [Right] at one time, then display is returned to Menu with display of "ESCAPE".

③ Error in menu editing

- Error is as below.

Display	Cause
notuSE	Menu that is used or impossible to set up
Err1	- In case of the menu is impossible to edit at Servo ON. - Error in editing Motor relative constant. - Input the value that does not have Motor ID. - In case of editing detailed constant on the state that Motor ID is not "0"
Err2	When setting the data that is out of range
Err3	Menu setting[PC-810] is locked. It should be unlocked.

④ Special handling function.

- In case of setting I/O state menu, the function of each key is handled as exclusive way. For a detailed, refer to chapter 5, Handling and Operating.
- Alarm Handling menu
- I/O setting menu
- Test operation menu
- Gain tuning menu
- Z position operation menu
- Absolute encoder reset
- Current offset compensation menu
- Menu Handling menu

4.2 Menu Operation

4.2.1 Menu Summary

Menu consists of 9 menu groups, and function of each menu is as below.

Comm. Code	Name of Menu Group	Function
Pd-001 ~ Pd-020	Status Menu	Indicate operation status information of Each Servo.
PA-101 ~ PA-120	Alarm Menu	Save & Indicate records of Alarm that is Happened before.
PE-201 ~ PE-220	System Menu	Save information of system construction
PE-301 ~ PE-320	Control Menu	Save set variables that are related to control.
PE-401 ~ PE-420	Analog Menu	Save set variables that are related to analog I/O.
PE-501 ~ PE-520	InOut Menu	Save set variables that are related to I/O connection.
PE-601 ~ PE-620	Speed Operation Menu	Stores set variables that is related to Speed operation
PE-701 ~ PE-720	Pulse Operation Menu	Save set variables that are related to position pulse operation
PC-801 ~ PC-820	Command Menu	Execute operation handling

From the below menu table, the abbreviation for each mode means ;

P : Used at Position control mode

S : Used at Speed control mode

T : Used at Torque control mode

4.2.2 Operation State Indicating Menu

<table>
<tr><th colspan="3">MENU</th><th>Unit</th><th>INI</th><th rowspan="2">Description</th><th rowspan="2">App Mode</th></tr>
<tr><th>Com Code</th><th>CODE</th><th>NAME</th><th>Min</th><th>Max</th></tr>
<tr><td>0</td><td>Pd-001</td><td>Current State</td><td>-
-</td><td>-
-</td><td>Display current operating status.

<table><tr><th>Display</th><th>Description</th></tr><tr><td>nor-on</td><td>Normal Servo On</td></tr><tr><td>nor-oF</td><td>Normal Servo Off</td></tr><tr><td>AL-XX</td><td>Alarm with applied code</td></tr></table>
- When reset after removing Alarm cause, the display is decided by “Start Menu no. [PE-209].</td><td>PST</td></tr>
<tr><td>1</td><td>Pd-002</td><td>Current Speed</td><td>[r/min]
-10000</td><td>0
10000</td><td>Display Current Speed.</td><td>PST</td></tr>
<tr><td>2</td><td>Pd-003</td><td>Command Speed</td><td>[r/min]
-10000</td><td>0
10000</td><td>Display Current command speed.</td><td>ST</td></tr>
<tr><td>3</td><td>Pd-004</td><td>Current Pulse</td><td>[pulse]
-99999</td><td>0
99999</td><td>Display cumulative position command pulse.

- Display input cumulative command pulse from Servo Power On</td><td>P</td></tr>
<tr><td>4</td><td>Pd-005</td><td>Feedback Pulse</td><td>[pulse]
-99999</td><td>0
99999</td><td>Display feedback cumulative position Command pulse.

- Display feedback cumulative position Command pulse from Power On.
- When exceed Max. Min. Value, only Min.(0), Max.(99999) is displayed</td><td>PST</td></tr>
<tr><td>5</td><td>Pd-006</td><td>Pulse Error</td><td>[pulse]
0</td><td>0
99999</td><td>Display remained pulse which must be operated.

- Difference between commanded pulse and feedback pulse (the motor must be operated as the amount of this value).
- Remained pulse no. at Servo OFF will be disappear when servo is On.</td><td>P</td></tr>
<tr><td>6</td><td>Pd-007</td><td>E-Gear N0</td><td>-
1</td><td>1000
60000</td><td>Display numerator 0 of electronic Gear ratio.
- When gear ratio is changed from abrasion of Machine, to compensate this abrasion, Offset adjusting can be used[PE-712]</td><td>P</td></tr>
</table>

<table>
<tr><td rowspan="2">7</td><td rowspan="2">Pd-008</td><td rowspan="2">Command Torque</td><td>[%]</td><td>0</td><td rowspan="2">Display Current commanded torque at torque mode.

<table><tr><th>Mode</th><th>Display Type</th></tr><tr><td>Torque</td><td>Current command Torque</td></tr><tr><td>Speed</td><td rowspan="2">Calculated current command torque</td></tr><tr><td>Position</td></tr></table>
- Display current torque as Percentage compare with rated torque.</td><td rowspan="2">T</td></tr>
<tr><td>-300.00</td><td>300.00</td></tr>
<tr><td rowspan="2">8</td><td rowspan="2">Pd-009</td><td rowspan="2">Torque Limit</td><td>[%]</td><td>300</td><td rowspan="2">Display Torque Limit setting Value.

- Display Max. torque value which motor can make as percentage value compare with rated torque.</td><td rowspan="2">PST</td></tr>
<tr><td>-300</td><td>300</td></tr>
<tr><td rowspan="2">9</td><td rowspan="2">Pd-010</td><td rowspan="2">Current Load</td><td>[%]</td><td>0.00</td><td rowspan="2">Display current load ratio compare to rated load.
- Load which is made by motor is displayed as percentage compare to rated load.</td><td rowspan="2">PST</td></tr>
<tr><td>0.00</td><td>300.00</td></tr>
<tr><td rowspan="2">10</td><td rowspan="2">Pd-011</td><td rowspan="2">Average Load</td><td>[%]</td><td>0.00</td><td rowspan="2">Display average load ratio for 5 seconds.

- Average load ratio for 5 seconds which is made by motor is displayed as percentage compare to rated load.</td><td rowspan="2">PST</td></tr>
<tr><td>0.00</td><td>300.00</td></tr>
<tr><td rowspan="2">11</td><td rowspan="2">Pd-012</td><td rowspan="2">Maximum Load</td><td>[%]</td><td>0.00</td><td rowspan="2">Display peak load ratio compared to rated.

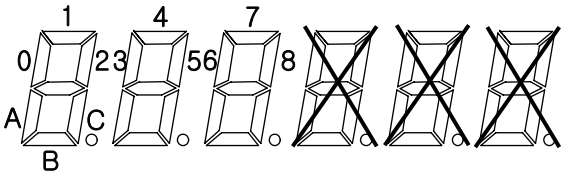
- Display the peak load as percentage compare to rated load from Servo On</td><td rowspan="2">PST</td></tr>
<tr><td>-300.00</td><td>300.00</td></tr>
<tr><td rowspan="2">12</td><td rowspan="2">Pd-013</td><td rowspan="2">DC Link Voltage</td><td>[V]</td><td>0.0</td><td rowspan="2">Display DC Link Voltage of Main power.

- DC Link Voltage of standard drive which is using 220[V] is around 300[V].

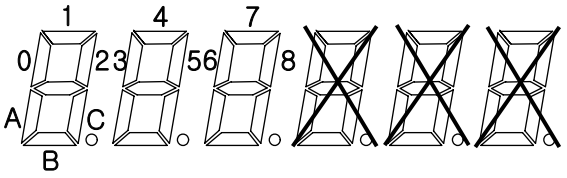
- Max. Allowable DC Link Voltage of standard drive which is using 220[V] is 400[V].

- When regenerated energy is big or the capacity of regenerative resistor is small, DC Link voltage is excess to Limit, then Over Voltage [AL-10] is displayed.

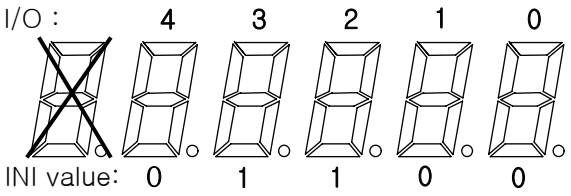
- Less than 380[V] in regenerative sector is recommended.</td><td rowspan="2">PST</td></tr>
<tr><td>0.0</td><td>500.0</td></tr>
</table>

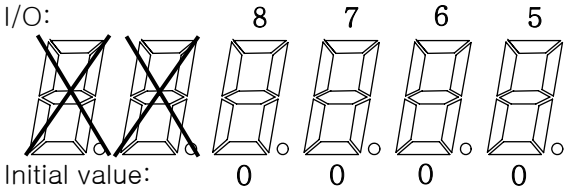
<table>
<tr>
<td rowspan="2">13</td>
<td rowspan="2">Pd-014</td>
<td rowspan="2">I/O SET Display</td>
<td>-</td>
<td>-</td>
<td rowspan="2">Display H/W contact condition of CN1 I/O. Display output status of output contacts.
 

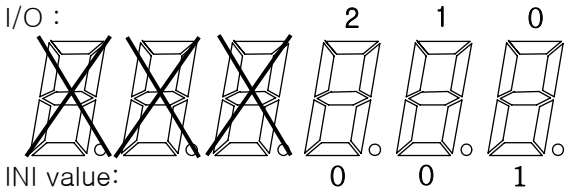
[Input contacts : UP]
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>SVON</td><td>ALMRST</td><td>CCWLIM</td><td>CWLIM</td><td>PCLEAR
STOP
TCLEAR</td></tr><tr><td>5</td><td>6</td><td>7</td><td>8</td><td></td></tr><tr><td>DIR</td><td>MODE
/TRQLIM</td><td>SPD1
/ EGEAR1</td><td>SPD2
/ EGEAR2</td><td></td></tr></table>
[Output contacts : Down]
<table><tr><td>A</td><td>B</td><td>C</td></tr><tr><td>ALARM</td><td>READY
/BRAKE</td><td>INSPD
/INPOS</td></tr></table>
※ When servo is stopped, INSPD/INPOS contacts is On.</td>
<td rowspan="2">PST</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td rowspan="2">14</td>
<td rowspan="2">Pd-015</td>
<td rowspan="2">Reg. Brake Time</td>
<td>0</td>
<td>0</td>
<td rowspan="2">Display setting state of operating time for regenerative resistor.

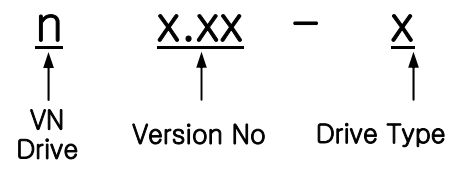
Display the Value of [PE-419].</td>
<td rowspan="2">PST</td>
</tr>
<tr>
<td>[ms]</td>
<td>3000</td>
</tr>
<tr>
<td rowspan="2">15</td>
<td rowspan="2">Pd-016</td>
<td rowspan="2">I/O State Display</td>
<td>-</td>
<td>-</td>
<td rowspan="2">Display finial I/O contacts setting condition of CN1 I/O.
 

[Input contacts : UP]
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>SVON</td><td>ALMRST</td><td>CCWLIM</td><td>CWLIM</td><td>PCLEAR
/ STOP
/TCLEAR</td></tr><tr><td>5</td><td>6</td><td>7</td><td>8</td><td></td></tr><tr><td>DIR</td><td>MODE
/TRQLIM</td><td>SPD1
/ EGEAR1</td><td>SPD2
/ EGEAR2</td><td></td></tr></table>
[Output contacts : Down]
<table><tr><td>A</td><td>B</td><td>C</td></tr><tr><td>ALARM</td><td>READY
/BRAKE</td><td>INSPD
/INPOS</td></tr></table>
※ When servo is stopped, INSPD/INPOS contacts is On.</td>
<td rowspan="2">PST</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
</tr>
</table>

<table>
<tr><td rowspan="2">16</td><td rowspan="2">Pd-017</td><td rowspan="2">Input Logic Display (State of input logic 0 ~4)</td><td>-</td><td>01100</td><td rowspan="2">Display Setting Logic of input contacts 0 ~ 4
(A contacts : 0, B contacts : 1)
 

<table><tr><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>STOP</td><td>CWLIM</td><td>CCWLIM</td><td>ALARM</td><td>SVON</td></tr></table></td><td rowspan="2">PST</td></tr>
<tr><td>00000</td><td>11111</td></tr>
<tr><td rowspan="2">17</td><td rowspan="2">Pd-018</td><td rowspan="2">Input Logic Display (State of input logic 5 ~8)</td><td>-</td><td>0000</td><td rowspan="2">Display setting logic of input contacts 5 ~ 8.
(A contacts:0 , B contacts: 1)
 

<table><tr><td>8</td><td>7</td><td>6</td><td>5</td></tr><tr><td>EGEAR2
/ SPD2</td><td>EGEAR1
/ SPD1</td><td>MODE
/ TRQLIM</td><td>DIR</td></tr></table></td></tr>
<tr><td>0000</td><td>1111</td></tr>
<tr><td rowspan="2">18</td><td rowspan="2">Pd-019</td><td rowspan="2">Output Logic Display</td><td>-</td><td>001</td><td rowspan="2">Display setting logic of output contacts.
(A contacts : 0, B contacts : 1)
 

<table><tr><td>2</td><td>1</td><td>0</td></tr><tr><td>INSPD/INPOS</td><td>READY/BRAKE
Select from [PE-508]</td><td>ALARM</td></tr></table></td></tr>
<tr><td>000</td><td>111</td></tr>
<tr><td rowspan="2">19</td><td rowspan="2">Pd-020</td><td rowspan="2">Software Version</td><td>-</td><td>-</td><td rowspan="2">Display software version.
 

<table><tr><td>No.</td><td>Drive Type</td></tr><tr><td>1</td><td>VN01</td></tr><tr><td>2</td><td>VN02</td></tr><tr><td>3</td><td>VN04</td></tr><tr><td>4</td><td>VN07</td></tr><tr><td>5</td><td>VN10</td></tr><tr><td>6</td><td>VN15</td></tr><tr><td>7</td><td>VN20</td></tr><tr><td>8</td><td>VN35</td></tr></table></td><td rowspan="2">PST</td></tr>
<tr><td>-</td><td>-</td></tr>
</table>

* When return to Menu from Alarm condition, press [Left] or [Right] then [Enter].

4.2.3 Alarm state indicating Menu

MENU			Unit	INI	Description	App Mode
Com	CODE	NAME	Min.	Max.		
Alarm history 01 ~ 20			-	-	Display Alarm state that happened before	PST
20 ~ 39	PA-101 ~ PA-120	Alarm History01 ~ Alarm History20	-	-		

Alarm code and Details

CODE	Name	Cause	Check Point
nor-oF	Normal svoff	Servo OFF normal condition	-
nor-on	Normal svon	Servo ON normal condition	-
AL-01	Not used		
AL-02	Low Voltage	Low voltage or Turn off of Main Power	Check input voltage level, Wiring of Power
AL-03	Line Fail	U,V,W wiring error (motor, encoder)	Check parameter, CN2 wiring, U,V,W wiring, Replace motor
AL-04	Motor Output	Error of output open error	Check IPM module or U,V,W wiring
AL-05	Encoder Pulse	Setting error for No. of encoder pulse	Check parameter [PE-204], CN2 wiring, replaced motor
AL-06	Following Error	Pulse following Error	Check Wiring, Limit contacts, over range of input pulse, gain, setting value of [PE-502], [PE-718]
AL-07	Over Heat	Over Heat	Check load condition, Fan.
AL-08	Over Current	Over Current	Wiring, Motor PTP resistor, encoder setting value, replace drive
AL-09	Over Load	Over Load	Load condition, Brake condition, wiring, Motor, encoder setting value
AL-10	Over Voltage	Over Voltage	Input power, condition of regeneration resistor
AL-11	Over Speed	Over Speed	Check Encoder, wiring, Gain, or replace Motor
AL-12	Not Used	Not Used	
AL-13	Position Pulse error	Position Pulse error	Replace Drive
AL-14	ABS Data Error	ABS Data Error	Initial reset
AL-15	ABS Battery Error	ABS Battery Error	Initial Reset, battery discharge
AL-16	ABS Multi Error	ABS Multi Data Error	Initial Reset
AL-17	ABS Read Fail	ABS. encoder reading error	Check Abs. encoder, CN2 wiring
AL-18	U-Hall Offset Error	U phase current sensor error	Replace Drive
AL-19	V-Hall Offset Error	V phase current sensor error	Replace Drive
AL-20	Memory Error	Parameter Memory Error	Replace Drive
AL-21	Not Used	Not used	
AL-22	Data Init Error	Data Init Error	Replace Drive
AL-23	EPWR	H/W error, Power error of 9line encoder	Replace Drive..
AL-24	USB Error	USB Communication error	Check wiring, replace Drive
AL-25	RS422 Error	RS422 Communication error	Check wiring, replace Drive
AL-26	Over Regeneration	Over Regeneration (error of [PE-419] setting time)	Check Input power, regeneration resistor , Replaced drive
AL-27	Current Limit Over	Excess limited current (Over 1 sec.)	Check Motor wiring and Load condition
AL-28	Not Used	Not used	
AL-29	Not Used	Not used	
AL-30	In/Out Logic error	Error of I/O setting logic	Change parameter value
AL-31	Encoder N/D Error	Encoder N/D Error	Change parameter value
AL-32	Egear N/D Error	Egear N/D Error	Change parameter value
Err1	Error1	Edit menu which is not allowed to edit under Servo-on condition	Edit parameter after Servo-off
Err2	Error2	When set over scope of data to parameter	Set parameter within scope
Err3	Error3	When edit menu under (Menu data Lock) [PC-810] condition	After changing [PC-810] parameter to Unlock, Edit menu of parameter.

4.2.4 System Variables Setting Menu

"**" Editing is not allowed under Servo-On & Reset Menu, "*" Editing is not allowed under Servo-On.

<table>
<tr><th colspan="3">MENU</th><th>Unit</th><th>INI</th><th rowspan="2">Description</th><th>App</th></tr>
<tr><th>Com</th><th>CODE</th><th>NAME</th><th>Min.</th><th>Max.</th><th>Mode</th></tr>
<tr><td rowspan="2">40</td><td rowspan="2">*PE-201</td><td rowspan="2">Motor ID</td><td>-</td><td>-</td><td rowspan="2">Set Motor ID
- Input Motor ID into Menu, then all of related parameter for motor is automatically changed.
- Parameter [PE-210] ~ [PE-218] is set as followed motor ID automatically.

※ Refer to Motor Type and ID from Appendix. 2</td><td rowspan="2">PST</td></tr>
<tr><td>0</td><td>99</td></tr>
<tr><td rowspan="2">41</td><td rowspan="2">*PE-202</td><td rowspan="2">RS422 Baud Rate</td><td>[bps]</td><td>0</td><td rowspan="2">Set RS422 Communication Speed at CN3
<table><tr><th>No.</th><th>Communication Speed</th></tr><tr><td>0</td><td>9600[bps]</td></tr><tr><td>1</td><td>19200[bps]</td></tr><tr><td>2</td><td>38400[bps]</td></tr><tr><td>3</td><td>57600[bps]</td></tr></table></td><td rowspan="2">PST</td></tr>
<tr><td>0</td><td>3</td></tr>
<tr><td rowspan="2">42</td><td rowspan="2">**PE-203</td><td rowspan="2">Encoder Type</td><td>-</td><td>0</td><td rowspan="2">Set applied Encoder.
Type of encoder is as followed.
<table><tr><th>No.</th><th>Encoder Type</th><th>Method</th><th>Signal</th></tr><tr><td>0</td><td>15Line Parallel</td><td>A Phase Lead</td><td>A,B,Z, U,V,W</td></tr><tr><td>1</td><td>15Line Parallel</td><td>B Phase Lead</td><td>A,B,Z, U,V,W</td></tr><tr><td>2</td><td>9Line Parallel</td><td>A Phase Lead</td><td>A,B,Z,</td></tr><tr><td>3</td><td>9Line Parallel</td><td>B Phase Lead</td><td>A,B,Z,</td></tr><tr><td>4</td><td>7Line Serial</td><td>Inc. 17~21bit</td><td>Commui -cation</td></tr></table>
Caution) If encoder type will not matched with actual encoder on motor, Motor can be operated with unstable speed</td><td rowspan="2">PST</td></tr>
<tr><td>0</td><td>4</td></tr>
</table>

43	**PE-204	Encoder Pulse	[p/r] 1	2500 6000	Set PPR (Pulse per resolution) of encoder. - When the encoder which is used A.B pulse signal, Set No. of Pulse per 1 rotation. At this time the no. of pulse for A, B is the same. Caution) If encoder type will not matched with actual encoder on motor, Motor can be operated with unstable speed .	PST
44	PE-205	CCW TRQ Limit	[%] 1	300 350	Set Limit Torque for CCW. - Setting value is the percentage of rated Torque. And default value is 300[%].	PST
45	PE-206	CW TRQ Limit	[%] 1	300 350	Set Limit Torque for CW - Setting value is the percentage of rated Torque. And default value is 300[%].	PST
46	*PE-207	System ID	- 0	0 99	Set Drive ID at Communiation. - When Servo is communicated with RS422 communication or BUS communication, the nominated Servo ID can be used. - Servo can be communicated individually with identified ID	PST
47	*PE-208	System Group ID	- 0	0 99	Set Drive Group ID at Communication. - When several drives are operated as group, Group ID can be used.	PST
48	PE-209	Start Menu No.	- 1	2 20	Set drive start Menu. - Set the parameter which is displayed when drive servo ON from [Pd-001] to [Pd-020]	PST

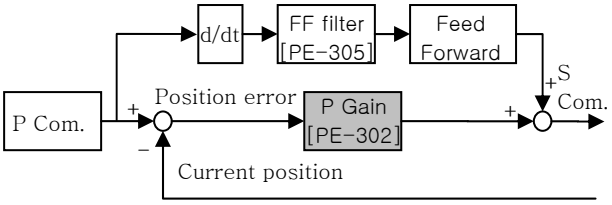
49	*PE-210	Inertia	[gf·cm·s^2]	ID	Set Motor Inertia. - When [PE-201](Motor ID) is “0”, Editing is possible	PST
			0.01	300.00		
50	*PE-211	Trq Con	[kgf·cm/A]	ID	Set Motor Torque constant. - When [PE-201](Motor ID) is “0”, Editing is possible	PST
			0.01	300.00		
51	*PE-212	Phase Ls	[mH]	ID	Set Motor Phase Ls - When [PE-201](Motor ID) is “0”, Editing is possible	PST
			0.001	30.000		
52	*PE-213	Phase Rs	[ohm]	ID	Set motor Phase Rs. - When [PE-201](Motor ID) is “0”, Editing is possible	PST
			0.001	30.000		
53	*PE-214	Rated Is	[A]	ID	- Set motor rated current. - When [PE-201](Motor ID) is “0”, Editing is possible	PST
			0.01	999.99		
54	*PE-215	Max Speed	[r/min]	ID	Set motor Max. speed. - When [PE-201](Motor ID) is “0”, Editing is possible	PST
			0.0	300.00		
55	*PE-216	Rated Speed	[r/min]	ID	Set Motor rated speed - When [PE-201](Motor ID) is “0”, Editing is possible.	PST
			0.0	10000		
56	*PE-217	Pole Number	[pole]	ID	Set Motor Pole no. - When [PE-201](Motor ID) is “0”, Editing is possible.	PST
			2	98		
57	*PE-218	Motor Gain Group	-	0	Set Motor Gain Group - When [PE-201](Motor ID) is “0”, Editing is possible .	
			0	9		
58	PE-219	U Current Offset Display	[mA]	0	Display U phase current Offset	
			-200	200		
59	PE-220	V Current Offset Display	[mA]	0	Display V phase current Offset	
			-200	200		

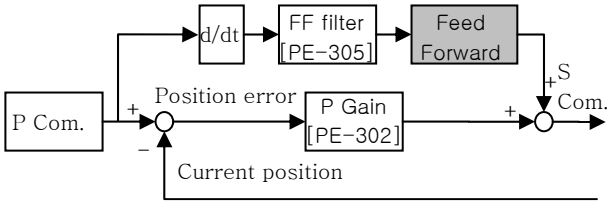
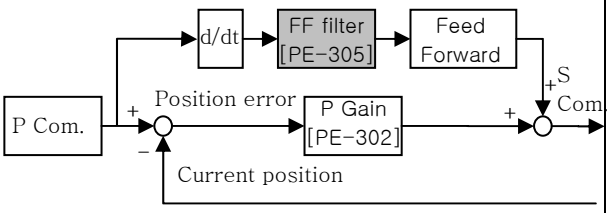
4.2.5 Control Variables Setting Menu

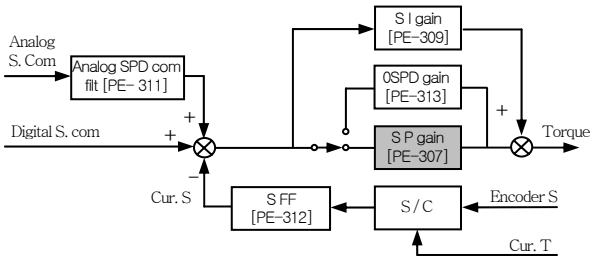
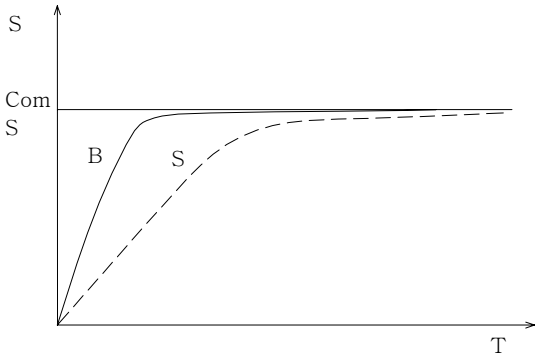
"**" Editing is not allowed under Servo-On & Reset Menu, "*" Editing is not allowed under Servo-On.

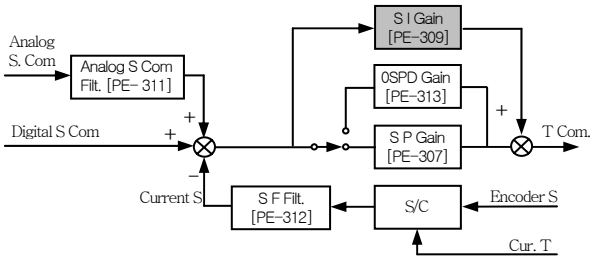
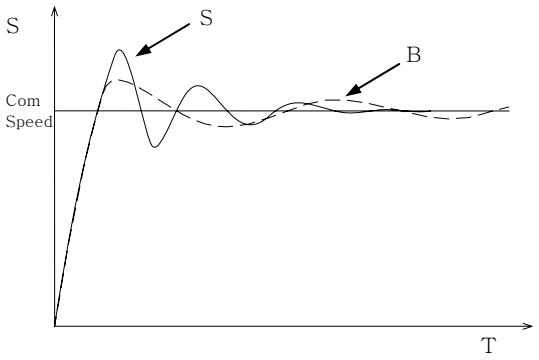
<table>
<tr><th colspan="3">MENU</th><th>Unit</th><th>INI</th><th rowspan="2">Description</th><th rowspan="2">App Mode</th></tr>
<tr><th>Com</th><th>CODE</th><th>NAME</th><th>Min.</th><th>Max.</th></tr>
<tr><td rowspan="2">60</td><td rowspan="2">PE-301</td><td rowspan="2">Inertia Ratio</td><td>[Times]</td><td>2.0</td><td>Set Inertia ratio for Load

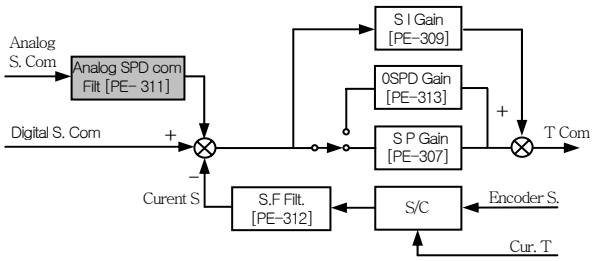
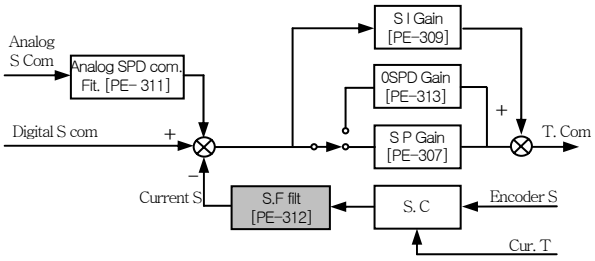
- When motor is operated with No load condition, the Inertia ratio is "1".
- Set proportion mechanical system load inertia to motor inertia which is on our catalog
- To optimize servo operation, accurate Inertia Ratio setting is required.
- Reference range for Position, Speed gain as followed Inertia ratio</td><td rowspan="2">PST</td></tr>
<tr><td>1.0</td><td>500.0</td><td>
<table>
<tr><th rowspan="2">Motor Frange</th><th colspan="2">Inertia ratio</th><th colspan="3">Gain setting range</th></tr>
<tr><th>Type</th><th>Inertia</th><th>Position P Gain</th><th>Speed P Gain</th><th>Speed I Gain</th></tr>
<tr><td rowspan="3">40</td><td>Low</td><td>1~5</td><td>50~120</td><td>500~120</td><td>5~30</td></tr>
<tr><td>Middle</td><td>5~20</td><td>40~80</td><td>400~600</td><td>10~50</td></tr>
<tr><td>High</td><td>20~40</td><td>30~60</td><td>300~500</td><td>20~70</td></tr>
<tr><td rowspan="3">60
~80</td><td>Low</td><td>1~5</td><td>40~100</td><td>400~1000</td><td>10~40</td></tr>
<tr><td>Middle</td><td>5~15</td><td>20~70</td><td>200~500</td><td>20~60</td></tr>
<tr><td>High</td><td>15~30</td><td>10~40</td><td>100~300</td><td>50~100</td></tr>
<tr><td rowspan="3">100
~130</td><td>Low</td><td>1~3</td><td>40~80</td><td>300~600</td><td>10~50</td></tr>
<tr><td>Middle</td><td>3~8</td><td>20~60</td><td>100~400</td><td>20~80</td></tr>
<tr><td>High</td><td>8~15</td><td>10~40</td><td>50~200</td><td>50~150</td></tr>
<tr><td rowspan="3">180
~220</td><td>Low</td><td>1~3</td><td>30~70</td><td>150~400</td><td>20~60</td></tr>
<tr><td>Middle</td><td>3~5</td><td>15~50</td><td>80~300</td><td>30~100</td></tr>
<tr><td>High</td><td>5~8</td><td>5~30</td><td>50~200</td><td>50~150</td></tr>
</table>
※ Refer to Motor specification for inertia of each motor in Chapter 6.
</td></tr>
</table>

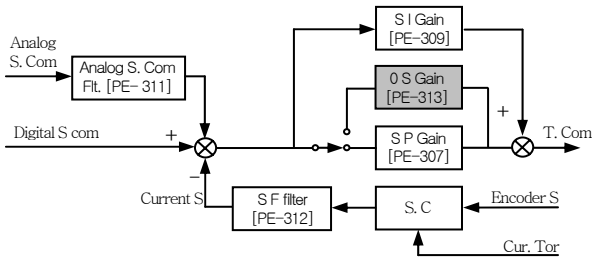
61	PE-302	Position P Gain1	[1/s] 1	50 500	Set Position control P Gain 1.  - Increase the gain till Speed over shoot or Vibration of motor. - When Gain Conv. Mode [PE-520] is 1, Pulse error is applied less tan [PE-306] (Position Zero gain). - Not applied when [PE-601](Mode selection)is Speed mode or Torque mode. ***Recommended value = Speed P Gain / 10**	P
62	PE-303	Position P Gain2	[1/s] 1	70 500	Set Position control P Gain 2. - This value is set as same or bigger than [PE-302](Position P Gain 1), Increase the value until speed over shoot or vibration of motor. **- When Gain Conv. Mode [PE-520] is 1,** When Pulse error range is over range of [PE-319](Position P Gain 2) in position mode. This parameter is applied.	P

63	PE-304	P Feedforward	[%] 0	0 100	Set control ratio of position feed forward.  - Use to reduce the time of settled position with get inclination from differential value, then add speed command to this inclination - if this value is big, overshoot can be occurred or system can be unstable. So the value must be increased from small value to big value step by step to find optimized value.	P
64	PE-305	P FF FLT TC	[ms] 0	0 100.00	Set Position Feed forward control time constant  - Sudden change of position comment can make unstable condition of system . At this case with setting FF TC filter value the vibration can be removed against rapid change.	P
65	PE-306	Position Zero Gain	[10pulse] 0	0 5000	Set range of change from P gain1 to P gain 2. **- When [PE-520](Gain Conv. mode) is 1** 위치제어모드에서 When Pulse error is bigger than [PE-306](position Zero gain range) under position mode, P gain1 is changed to P gain 2	P

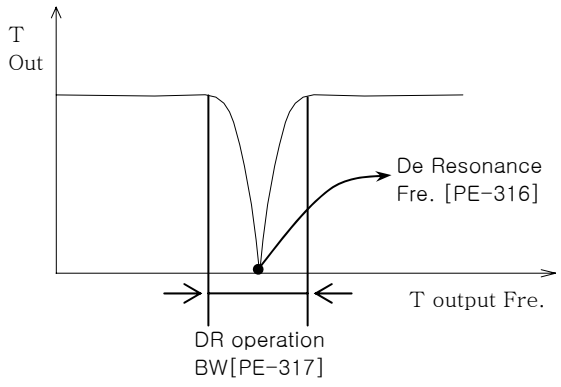
66	PE-307	Speed P Gain1	[rad/s] 0	500 5000	Set Speed P gain 1 Diagram of Speed control is as follows.  - Speed P gain convert to torque command with multipling Speed P gain error to P-Gain. **- Relation between Speed P gain & Actual Speed**  - if Speed P-gain value is big, the following speed is increased. But vibration can be happened. Also if the value is small, following speed is decreased and power of motor also decreased. **- When [PE-520](Gain Conv. mode) is 1** When actual speed is lower than [PE-313](Zero speed gain speed) this parameter is applied	PS
67	PE-308	속도비례게인2 Speed P Gain2	[rad/s] 0	800 5000	Set Speed P gain 2. - This value is set as bigger value than [PE-307]. - When **[PE-520](Gain Conv. mode) is 1** When actual speed is higher than [PE-313](0 SPD Gain SPD), Speed P gain1 is changed to Speed P gain 2	PS

68	PE-309	Speed I TC1	[ms] 1	20 10000	Set Speed I TC1.  **Relation Speed I TC and com./actual speed**  - Getting Integral calculus value for Speed error between command and current speed. Then covert to torque command with Multiplying this integral calculus value to I Gain value - if I TC is reduced, following speed is increased with improved response speed, but so small overshoot can be happened. - If value is so big, following speed is decreased. So P-gain also decreased. **- in case of [PE-520] (Gain Conv. mode) is 1** Applied at actual speed is lower than [PE-313] (ZSPD gain speed). **- Recommend setting value:10000/Speed I gain[PE-307]**	PS
69	PE-310	Speed I TC2	[ms] 1	13 1000	Set Speed I TC2. - This value is set by lower than [PE-309]. - in case of **[PE-520](Gain Conv. mode) is 1** When Actual speed is over [PE-313](Zero SPD Gain Speed), Speed I Gain1 is changed to Gain2.	PS

70	PE-311	Speed IN FT	[ms] 0.0	0.50 100.00	Set Speed command filter  - When analog input is not stable, with filter the sudden change can be removed. - When setting big value, make decreased response speed, proper value is needed..	S
71	*PE-312	Speed F/B FT	[ms] 0.0	0.50 100.0	Set Speed feedback filter  - Reduce the vibration with using speed feedback filter under the condition of motor speed is unstable, big inertia or vibration from Gain. - When setting big value, make decreased response speed or with stop vibration at stop condition system can be unstable condition, so proper value is needed. **- When system is unstable with stop vibration** Set applied range with [PE-313](ZSPD gain speed). When speed is lower than [PE-519](ZSPD gain rate) Vibration is controlled by adjusting of Gain rate. *** Recommended Setting value =** **0 ~ Speed I Gain[PE-309]/10**	PS

<table>
<tr><td rowspan="2">72</td><td rowspan="2">PE-313</td><td rowspan="2">Z SPD Gain
Speed</td><td>[r/min]</td><td>0</td><td rowspan="2">Set speed range of Zero speed gain.
 

- Speed control gain1 is changed to Gain2 when actual speed is over than [PE-313](zero speed gain speed).</td><td rowspan="2">PS</td></tr>
<tr><td>0</td><td>500</td></tr>
<tr><td rowspan="2">73</td><td rowspan="2">PE-314</td><td rowspan="2">TORQ. CMD FLT</td><td>[ms]</td><td>0.50</td><td rowspan="2">Set Torque filter.
- Remove the noise of commanded signal with setting digital filter for analog torque command voltage.

- When setting big value, make decreased response speed, proper value is needed.</td><td rowspan="2">PST</td></tr>
<tr><td>0.0</td><td>100.00</td></tr>
<tr><td rowspan="2">74</td><td rowspan="2">PE-315</td><td rowspan="2">DE-Resonance</td><td>-</td><td>0</td><td rowspan="2">Set function of DE-Resonance operation.
(under developing)
<table><tr><th>Mode</th><th>De-Resonance operation</th></tr><tr><td>0</td><td>Not operated</td></tr><tr><td>1</td><td>Operated</td></tr></table> 

- As followed system, the mechanical vibration can be occurred at certain frequency range. At this range of frequency Reduce the vibration which is caused by de-resonance with reducing torque output.</td><td rowspan="2">PST</td></tr>
<tr><td>0</td><td>1</td></tr>
</table>

<table>
<tr><td rowspan="2">75</td><td rowspan="2">PE-316</td><td rowspan="2">Notch Frequency</td><td>[Hz]</td><td>300</td><td rowspan="2">Set avoid resonance driving frequency.</td><td rowspan="2">PST</td></tr>
<tr><td>0</td><td>1000</td></tr>
<tr><td rowspan="2">76</td><td rowspan="2">PE-317</td><td rowspan="2">Notch Bandwidth</td><td>[Hz]</td><td>100</td><td rowspan="2">Set avoid resonance band width.</td><td rowspan="2">PST</td></tr>
<tr><td>0</td><td>1000</td></tr>
<tr><td rowspan="2">77</td><td rowspan="2">PE-318</td><td rowspan="2">Real time Auto Tuning</td><td>-</td><td>0</td><td rowspan="2">(Under developing)
0: Not used
1: Used</td><td rowspan="2">PST</td></tr>
<tr><td>0</td><td>1</td></tr>
<tr><td rowspan="2">78</td><td rowspan="2">PE-319</td><td rowspan="2">Position Gain2 Range</td><td>[10pulse]</td><td>20</td><td rowspan="2">Set pulse range of position P gain 2.

- Error pulse is over than the setting range of [PE-319](position P gain 2 range),, [PE-303](Position P gain 2) is applied.</td><td rowspan="2">S</td></tr>
<tr><td>1</td><td>5000</td></tr>
<tr><td rowspan="2">79</td><td rowspan="2">PE-320</td><td rowspan="2">Zero Speed Lock</td><td>-</td><td>1</td><td rowspan="2">Set zero speed torque improved function.

<table><tr><th>Mode</th><th>Zero improve Speed</th></tr><tr><td>0</td><td>Not used</td></tr><tr><td>1</td><td>Use</td></tr></table>
- Determine stop torque improved algorithm is applied or not.

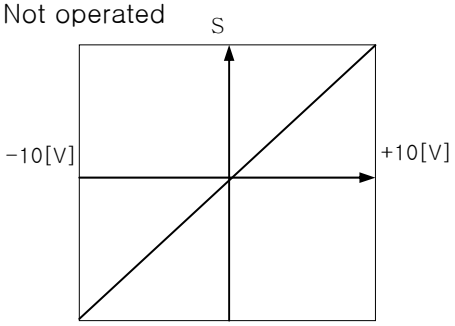
- After input contacts ‘STOP’, under the condition of below 100[rpm] or zero speed clamp[PE-403] is 1,
The mode is automatically changed Speed mode to position mode when the value is below than zero speed clamp voltage [PE-404] .</td><td rowspan="2">S</td></tr>
<tr><td>0</td><td>1</td></tr>
</table>

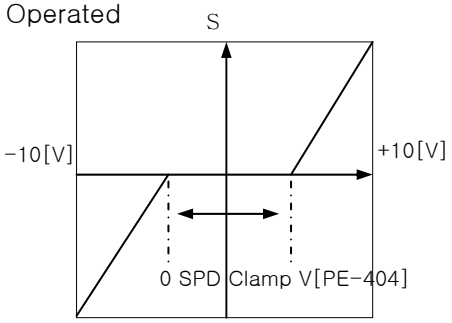
4.2.6 Analog I/O Variables Setting Menu

"**" Editing is not allowed under Servo-On & Reset Menu, "*" Editing is not allowed under Servo-On.

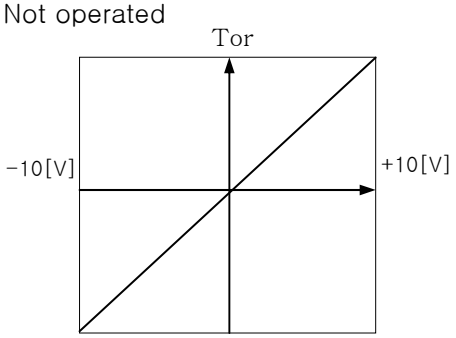
<table>
<tr><th colspan="3">MENU</th><th>Unit</th><th>INI</th><th rowspan="2">Description</th><th rowspan="2">Mode</th></tr>
<tr><th>Com</th><th>CODE</th><th>NAME</th><th>Min</th><th>Max</th></tr>
<tr><td rowspan="2">80</td><td rowspan="2">*PE-401</td><td rowspan="2">Analog Speed</td><td>[r/min]</td><td>2000</td><td rowspan="2">Set analog speed command at 10[V].
The unit of analog speed command 10[V] is [r/min].</td><td rowspan="2">ST</td></tr>
<tr><td>1</td><td>6000</td></tr>
<tr><td rowspan="2">81</td><td rowspan="2">PE-402</td><td rowspan="2">Analog Speed Offset</td><td>[mV]</td><td>0</td><td rowspan="2">Set Analog Speed command offset.

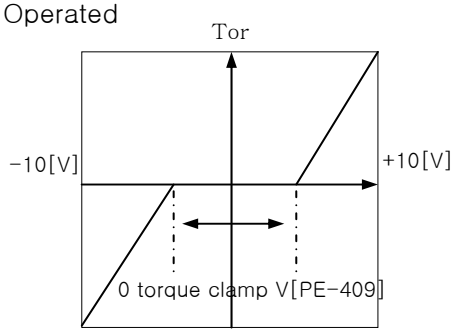
- Because of analog circuit problem, certain voltage is occurred during "0" torque command condition. At this time compensate this voltage with setting of certain voltage as offset.</td><td rowspan="2">S</td></tr>
<tr><td>-1000</td><td>1000</td></tr>
<tr><td rowspan="2">82</td><td rowspan="2">PE-403</td><td rowspan="2">Zero Speed Clamp</td><td>-</td><td>0</td><td rowspan="2">Set mode of clamp for analog zero speed command.

<table>
<tr><th>Mode</th><th>Zero clamp function</th></tr>
<tr><td>0</td><td>Not operated
 

SPD Com clamp mode [PE-403] = 0</td></tr>
<tr><td>1</td><td>Operated
 

SPD Com clamp mode[PE-403] = 1</td></tr>
</table>
</td><td rowspan="2">S</td></tr>
<tr><td>0</td><td>1</td></tr>
<tr><td rowspan="2">83</td><td rowspan="2">PE-404</td><td rowspan="2">SClamp Volt</td><td></td><td>1</td><td rowspan="2">Set range of analog 0 speed clamp</td><td rowspan="2">S</td></tr>
<tr><td>1</td><td>1000</td></tr>
</table>

<table>
<tr><td rowspan="2">84</td><td rowspan="2">*PE-405</td><td rowspan="2">Speed Override</td><td>-</td><td>0</td><td rowspan="2">Set speed override operation mode.
- Set analog speed override on digital speed command.
<table><tr><th>Mode</th><th>Speed Override operation</th></tr><tr><td>0</td><td>Not operated</td></tr><tr><td>1</td><td>Override operation</td></tr></table></td><td rowspan="2">S</td></tr>
<tr><td>0</td><td>1</td></tr>
<tr><td rowspan="2">85</td><td rowspan="2">*PE-406</td><td rowspan="2">Analog Torque</td><td>[%]</td><td>100</td><td rowspan="2">Set analog torque command at 10[V].
- Set analog torque command value compare with rated torque value as percentage at 10[V] at this time setting is within a range of torque limit [PE-205] [PE-206] system variable setting.</td><td rowspan="2">PST</td></tr>
<tr><td>1</td><td>300</td></tr>
<tr><td rowspan="2">86</td><td rowspan="2">PE-407</td><td rowspan="2">Torque Offset</td><td>[mV]</td><td>0</td><td rowspan="2">Set offset of analog torque command.
- Because of analog circuit problem, certain voltage is occurred during “0” torque command condition. At this time compensate this voltage with setting of certain voltage as offset.</td><td rowspan="2">T</td></tr>
<tr><td>-1000</td><td>1000</td></tr>
<tr><td rowspan="2">87</td><td rowspan="2">PE-408</td><td rowspan="2">TClamp Mode</td><td>-</td><td>0</td><td rowspan="2">Set clamp mode at analog zero torque command.
<table><tr><th>Mode</th><th>Zero torque clamp function</th></tr><tr><td>0</td><td>Not operated
 

O torque clamp mode [PE-408] = 0</td></tr><tr><td>1</td><td>Operated
 

0 torque clamp mode [PE-408] = 1</td></tr></table></td><td rowspan="2">T</td></tr>
<tr><td>0</td><td>1</td></tr>
</table>

<table>
<tr><td rowspan="2">88</td><td rowspan="2">PE-409</td><td rowspan="2">TClamp Volt</td><td>[mV]</td><td>1</td><td rowspan="2">Set analog Zero torque command clamp voltage.</td><td rowspan="2">T</td></tr>
<tr><td>1</td><td>1000</td></tr>
<tr><td rowspan="2">89</td><td rowspan="2">PE-410</td><td rowspan="2">Monitor Type1</td><td>-</td><td>1</td><td rowspan="2">Set analog output1 type for monitor.

<table><tr><th>Mode</th><th>Data</th><th>Mode</th><th>Data</th></tr><tr><td>0</td><td>Com. Speed</td><td>4</td><td>Com. Frequency</td></tr><tr><td>1</td><td>Cur. Speed</td><td>5</td><td>Err. Pulse</td></tr><tr><td>2</td><td>Com. Torque</td><td></td><td></td></tr><tr><td>3</td><td>Cur. Torque</td><td></td><td></td></tr></table>
- 2 kinds of 5[V] Analog output is possible. And output as followed setting parameter.</td><td rowspan="2">PST</td></tr>
<tr><td>0</td><td>5</td></tr>
<tr><td rowspan="2">90</td><td rowspan="2">PE-411</td><td rowspan="2">Monitor Mode1</td><td>-</td><td>0</td><td rowspan="2">Set mode of analog output 1 mode for monitor.
<table><tr><th>Mode</th><th>Output type</th></tr><tr><td>0</td><td>Direction : output -5 ~ 5[V]</td></tr><tr><td>1</td><td>Absolute : output 0 ~ 5[V]</td></tr></table></td><td rowspan="2">PST</td></tr>
<tr><td>0</td><td>1</td></tr>
<tr><td rowspan="2">91</td><td rowspan="2">PE-412</td><td rowspan="2">Monitor Scale1</td><td>-</td><td>1.0</td><td rowspan="2">Set Scale of analog output 1.

DC 5[V] is standard.
<table><tr><th>Item</th><th>Scale</th></tr><tr><td>Speed</td><td>Max. speed [PE-215]</td></tr><tr><td>Torque</td><td>Max speed [300[%]]</td></tr><tr><td>Frequency</td><td>500[kpps]</td></tr><tr><td>Error pulse</td><td>Position Error [PE-512]</td></tr></table>
- When output value is very small or big, the output can be change to properly with magnification</td><td rowspan="2">PST</td></tr>
<tr><td>0.1</td><td>50.0</td></tr>
</table>

<table>
<tr><td rowspan="3">92</td><td rowspan="3">PE-413</td><td rowspan="3">Monitor Offset1</td><td>[mV]</td><td>0</td><td rowspan="3">Set offset of analog output 1 for Monitor.

- Because of analog circuit problem, some voltage can be occurred during “0” voltage output. At this time, can set offset range. The unit is [㎷]</td><td rowspan="3">PST</td></tr>
<tr><td>-1000</td><td>1000</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td rowspan="3">93</td><td rowspan="3">PE-414</td><td rowspan="3">Monitor Type2</td><td>-</td><td>3</td><td rowspan="3">Set analog output2 type for monitor.

<table><tr><th>Mode</th><th>Data</th><th>Mode</th><th>Data</th></tr><tr><td>0</td><td>Com. Speed</td><td>4</td><td>Com. Frequency</td></tr><tr><td>1</td><td>Cur. Speed</td><td>5</td><td>Err. Pulse</td></tr><tr><td>2</td><td>Com. Torque</td><td></td><td></td></tr><tr><td>3</td><td>Cur. Torque</td><td></td><td></td></tr></table>- 2 kinds of 5[V] Analog output is possible. And output as followed setting parameter.</td><td rowspan="3">PST</td></tr>
<tr><td>0</td><td>5</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td rowspan="3">94</td><td rowspan="3">PE-415</td><td rowspan="3">Monitor Mode2</td><td>-</td><td>0</td><td rowspan="3">Set mode of analog output 2 mode for monitor.
<table><tr><th>Mode</th><th>Output type</th></tr><tr><td>0</td><td>Direction : output -5 ~ 5[V]</td></tr><tr><td>1</td><td>Absolute : output 0 ~ 5[V]</td></tr></table></td><td rowspan="3">PST</td></tr>
<tr><td>0</td><td>1</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td rowspan="3">95</td><td rowspan="3">PE-416</td><td rowspan="3">Monitor Scale2</td><td>-</td><td>1.0</td><td rowspan="3">Set Scale of analog output 2.

DC 5[V] is standard.
<table><tr><th>Item</th><th>Scale</th></tr><tr><td>Speed</td><td>Max. speed [PE-215]</td></tr><tr><td>Torque</td><td>Max speed [300[%]]</td></tr><tr><td>Frequency</td><td>500[kpps]</td></tr><tr><td>Error pulse</td><td>Position Error [PE-512]</td></tr></table>- When output value is very small or big, the output can be change to properly with magnification.</td><td rowspan="3">PST</td></tr>
<tr><td>0.1</td><td>50.0</td></tr>
<tr><td colspan="2"></td></tr>
</table>

<table>
<tr><td>96</td><td>PE-417</td><td>Monitor Offset2</td><td>[mV]
-1000</td><td>0.0
1000</td><td>Set offset of analog output 2.

- Because of analog circuit problem, some voltage can be occurred during “0” voltage output. At this time, can set offset range. The unit is [㎷]</td><td>PST</td></tr>
<tr><td>97</td><td>PE-418</td><td>Torque Com Dir</td><td>-
0</td><td>0
1</td><td>Select rotation direction of motor in Torque mode as followed voltage.

<table><tr><th>Mode</th><th>Selection of torque Dir</th></tr><tr><td>0</td><td>At + voltage: forward</td></tr><tr><td>1</td><td>At – voltage: forward</td></tr></table></td><td>T</td></tr>
<tr><td>98</td><td>PE-419</td><td>Regeneration Brake time</td><td>[ms]
100</td><td>500
1000</td><td>Set Max. Operation time of regeneration brake resistor.

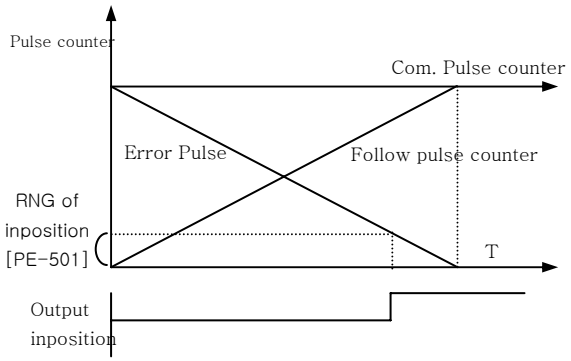
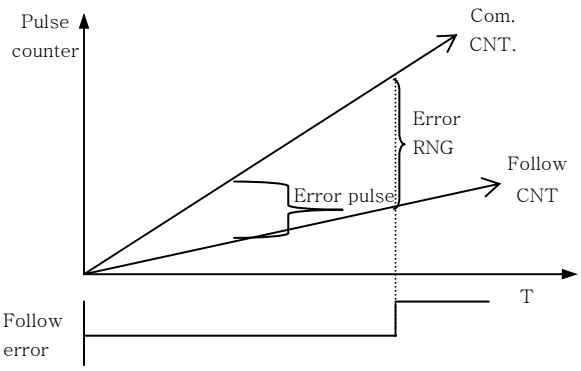
- When regeneration brake resistor is operated over setting time, [AL-26](over regeneration) is displayed.</td><td></td></tr>
<tr><td>99</td><td>PE-420</td><td>Analog Speed, Torque Command Offset</td><td>-
0</td><td>0
3</td><td>Apply analog offset function [PC-813], [PC-814].

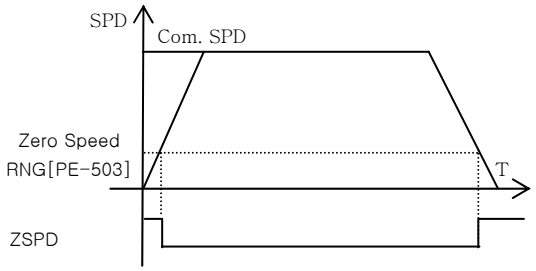
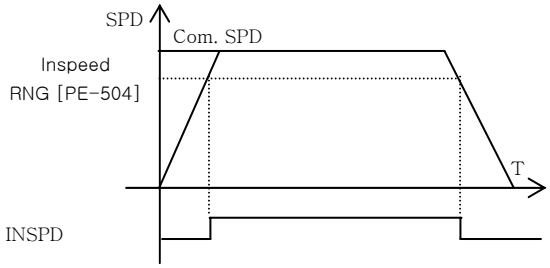
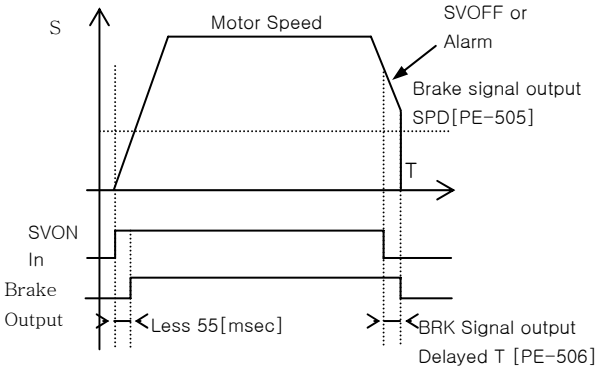
- Some voltage on analog signal circuit can be occurred during O speed command.
At this time Set applied function to set torque command voltage offset automatically..
-With selection of below mode, Analog Speed command voltage offset [PC-813] and Analog torque command voltage offset[PC-814] can be used..

<table><tr><th>Mode</th><th>Analog speed. Torque command offset</th></tr><tr><td>0</td><td>Not used</td></tr><tr><td>1</td><td>Applied [PC-813]</td></tr><tr><td>2</td><td>Applied [PC-814]</td></tr><tr><td>3</td><td>Applied [PC-813] &, [PC-814]</td></tr></table></td><td>ST</td></tr>
</table>

4.2.7 I/O Contacts Variables Setting Menu

"**" Editing is not allowed under Servo-On & Reset Menu, "*" Editing is not allowed under Servo-On.

MENU			Unit	INI	Description	Mode
Com	CODE	NAME	Min	Max		
100	PE-501	Inposition	[10pulse] 1	10 60000	Set output range of inposition.  - When the error pulse between commanded pulse and following pulse is within setting range, Inposition signal is output ※ Applied Setting value * 10 Pulse.	P
101	PE-502	Following Error	[10pulse] 1	90000 60000	Set the range of position operation following error signal.  - When Error pulse is bigger than range of following error pulse, Alarm signal is output. ※ Applied Setting value * 10 Pulse.	P

102	PE-503	Zero Speed RNG	[r/min] 0.0	10 6000	Set output range of Zero Speed.  - Current speed is lower than setting value (ZSPD), signal is output.	PST
103	PE-504	Inspeed	[r/min] 0.0	100 500	Set the range of insped .  - Gap between current speed and commanded speed is within setting value, the signal is output.	S
104	PE-505	Brake SPD	[r/min] 0.0	50 6000	Set speed of brake operation signal output.  - When brake type motor is used for vertical axis. to prevent falling down of motor during Alarm or SVOFF time, the brake signal can be OFF with first signal of Brake signal output speed[PE-505] or Brake signal output delayed time[PE-506]	PST

<table>
<tr><td rowspan="2">105</td><td rowspan="2">PE-506</td><td rowspan="2">Brake On Delay Time</td><td>[ms]</td><td>10</td><td rowspan="2">Set Brake operating signal output delayed time</td><td rowspan="2">PST</td></tr>
<tr><td>0</td><td>1000</td></tr>
<tr><td rowspan="2">106</td><td rowspan="2">PE-507</td><td rowspan="2">PowerFail Mode</td><td>-</td><td>1</td><td rowspan="2">Set reset mode of main power fail.
<table><tr><th>Mode</th><th>Type</th></tr><tr><td>0</td><td>Manual reset</td></tr><tr><td>1</td><td>Auto reset</td></tr></table></td><td rowspan="2">PST</td></tr>
<tr><td>0</td><td>1</td></tr>
<tr><td rowspan="2">107</td><td rowspan="2">PE-508</td><td rowspan="2">Ready / Brake Select</td><td>-</td><td>0</td><td rowspan="2">Select output contacts for Ready/Brake.
<table><tr><th>Mode</th><th>Output contact type</th></tr><tr><td>0</td><td>Ready output</td></tr><tr><td>1</td><td>Brake output</td></tr></table></td><td rowspan="2">PST</td></tr>
<tr><td>0</td><td>1</td></tr>
<tr><td rowspan="2">108</td><td rowspan="2">PE-509</td><td rowspan="2">Pulse Clear Mode</td><td>-</td><td>1</td><td rowspan="2">Set Position pulse clear mode.
<table><tr><th>Mode</th><th>Position Pulse clear mode type</th></tr><tr><td>0</td><td>Edge(off->on)</td></tr><tr><td>1</td><td>Level(on)</td></tr></table>
- Stop the motor with clear input position command.</td><td rowspan="2">P</td></tr>
<tr><td>0</td><td>1</td></tr>
<tr><td rowspan="2">109</td><td rowspan="2">**PE-510</td><td rowspan="2">Pulse Output Numerator</td><td>-</td><td>1</td><td rowspan="2">Set Numerator for divide ratio of encoder output pulse.

- Divide for less than 4096[pulse] is available for serial encoder.
- When send encoder pulse as output signal of drive, the output pulse is sent with divided ratio.</td><td rowspan="2">PST</td></tr>
<tr><td>1</td><td>16384</td></tr>
<tr><td rowspan="2">110</td><td rowspan="2">**PE-511</td><td rowspan="2">Pulse output Denominator</td><td>-</td><td>1</td><td rowspan="2">Set Denominator for divide ratio of encoder output pulse

- divide for less than 4096[pulse] is available for serial encoder.
- When send encoder pulse as output signal of drive, the output pulse is sent with divided ratio.</td><td rowspan="2"></td></tr>
<tr><td>1</td><td>16384</td></tr>
</table>

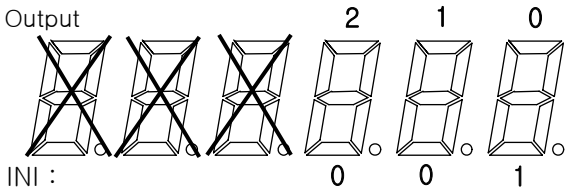
<table>
<tr><td rowspan="2">111</td><td rowspan="2">**PE-512</td><td rowspan="2">Pulse Output
A / B Lead</td><td>-</td><td>0</td><td rowspan="2">Set Encoder output pulse (A/B phase).

<table><tr><th>Mode</th><th>Output type of A / B phase</th></tr><tr><td>0</td><td>A상 Lead</td></tr><tr><td>1</td><td>B상 Lead</td></tr></table></td><td rowspan="2">PST</td></tr>
<tr><td>0</td><td>1</td></tr>
<tr><td rowspan="2">112</td><td rowspan="2">PE-513</td><td rowspan="2">Pulse Output Z</td><td>-</td><td>1</td><td rowspan="2">Set output type of serial encoder Z phase.

<table><tr><th>Mode</th><th>Encoder Z phase output type</th></tr><tr><td>0</td><td>A Phase half cycle</td></tr><tr><td>1</td><td>A Phase one cycle</td></tr></table></td><td rowspan="2"></td></tr>
<tr><td>0</td><td>1</td></tr>
<tr><td rowspan="2">113</td><td rowspan="2">PE-514</td><td rowspan="2">Dir Select Mode</td><td>-</td><td>0</td><td rowspan="2">Set direction S/W.

<table><tr><th rowspan="3">Set</th><th colspan="6">Operation Method</th></tr><tr><th colspan="2">CCW</th><th colspan="2">CW</th><th colspan="2">STOP</th></tr><tr><th>DIR</th><th>STOP</th><th>DIR</th><th>STOP</th><th>DIR</th><th>STOP</th></tr><tr><td>0</td><td>OFF</td><td>OFF</td><td>ON</td><td>OFF</td><td>x</td><td>ON</td></tr><tr><td rowspan="2">1</td><td rowspan="2">OFF</td><td rowspan="2">ON</td><td rowspan="2">ON</td><td rowspan="2">OFF</td><td>ON</td><td>ON</td></tr><tr><td>OFF</td><td>OFF</td></tr></table></td><td rowspan="2">S</td></tr>
<tr><td>0</td><td>1</td></tr>
<tr><td rowspan="2">114</td><td rowspan="2">*PE-515</td><td rowspan="2">Output Logic</td><td>-</td><td>001</td><td rowspan="2">Set logic of output contacts.

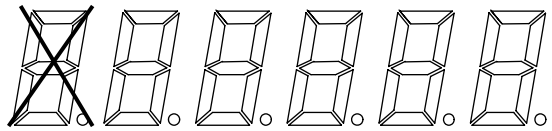
- Set output contacts logic from CN1 I/O.

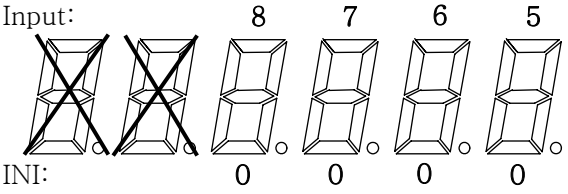
[Output contacts : Down]
<table><tr><th>0</th><th>1</th><th>2</th></tr><tr><td>ALARM</td><td>READY / BRAKE
Selected by [PE-508]</td><td>INSPD
/INPOS</td></tr></table></td><td rowspan="2">PST</td></tr>
<tr><td>000</td><td>111</td></tr>
</table>

<table>
<tr>
<td rowspan="2">115</td>
<td rowspan="2">PE-516</td>
<td rowspan="2">PWM off Delay</td>
<td>[ms]</td>
<td>0</td>
<td rowspan="2">Set delayed time to be actual PWM-OFF from Servo OFF.

- With “BRAKE” output contacts signal, compensate the preparation time of brake operation, Delay the PWM signal. prevent down operation of motor at vertical application.</td>
<td rowspan="2">PST</td>
</tr>
<tr>
<td>10</td>
<td>1000</td>
</tr>
<tr>
<td rowspan="2">116</td>
<td rowspan="2">*PE-517</td>
<td rowspan="2">Intput 0~4 Logic</td>
<td>-</td>
<td>01100</td>
<td rowspan="2">Set Logic input contacts 0~4.

Input: 4 3 2 1 0
 
INI: 0 1 1 0 0

<table><tr><th>Input</th><th>Input contacts</th></tr><tr><td>0</td><td>SVON</td></tr><tr><td>1</td><td>ALARM</td></tr><tr><td>2</td><td>CCWLIM</td></tr><tr><td>3</td><td>CWLLIM</td></tr><tr><td>4</td><td>PCLEAR / STOP / TCLEAR</td></tr></table></td>
<td rowspan="2"></td>
</tr>
<tr>
<td>00000</td>
<td>11111</td>
</tr>
<tr>
<td rowspan="2">117</td>
<td rowspan="2">*PE-518</td>
<td rowspan="2">Intput 5~8 Logic</td>
<td>-</td>
<td>0000</td>
<td rowspan="2">Set logic for Input contacts 5~8.

Input: 8 7 6 5
 
INI: 0 0 0 0

<table><tr><th>Input</th><th>Input contacts</th></tr><tr><td>5</td><td>DIR</td></tr><tr><td>6</td><td>TRQLIM / MODE</td></tr><tr><td>7</td><td>SPD 1 / EGEAR1</td></tr><tr><td>8</td><td>SPD 2 / EGEAR2</td></tr></table></td>
<td rowspan="2"></td>
</tr>
<tr>
<td>0000</td>
<td>1111</td>
</tr>
</table>

<table>
<tr><td rowspan="2">118</td><td rowspan="2">PE-519</td><td rowspan="2">ZSPD Gain Rate</td><td>[%]</td><td>50</td><td rowspan="2">Set ZSPD Gain rate.

- Stop vibration can be reduced at lower speed of [PE-303](Zero speed gain), with applying of stop vibration[PE-519] which is occurred bt big gain.

- But When rate is small, power of motor is decreased and response speed is also decreased at lower speed of Zero speed Gain [PE-313].

※ Not operated when [PE-313](Zero speed gain) is 0</td><td rowspan="2">S</td></tr>
<tr><td>1</td><td>100</td></tr>
<tr><td rowspan="2">119</td><td rowspan="2">*PE-520</td><td rowspan="2">Gain Conv Mode</td><td>-</td><td>0</td><td rowspan="2">Set Gain 1, Gain 2 mode

<table><tr><th>Set</th><th>Operation</th></tr><tr><td>0</td><td>Apply 1 gain between Speed or Position</td></tr><tr><td>1</td><td>1). Speed Mode [PE-601] : 1
a. Current speed is less than [PE-313]이하 : Applied Speed Gain 1
b. Current speed is over than [PE-313] : Applied Speed gain 2

2). Position Mode [PE-601] : 2
a. Current speed ≤ [PE-313] : Applied Speed control Gain 1
b. Current speed ≥ [PE-313] : Applied Speed control Gain 2
c. Error Pulse ≤ [PE-306] : Applied Position control Gain 1
d. Error Pulse ≥ [PE-319] : Applied Position control Gain 2</td></tr></table></td><td rowspan="2"></td></tr>
<tr><td>0</td><td>1</td></tr>
</table>

4.2.8 Speed Operation Variables Setting Menu

"**" Editing is not allowed under Servo-On & Reset Menu, "*" Editing is not allowed under Servo-On.

<table>
<tr><th colspan="3">MENU</th><th>Unit</th><th>INI</th><th rowspan="2">Description</th><th rowspan="2">Mode</th></tr>
<tr><th>Com</th><th>CODE</th><th>NAME</th><th>Min</th><th>Max</th></tr>
<tr><td>120</td><td>*PE-601</td><td>Operation Mode</td><td>-
0</td><td>1
5</td><td>Set Operation Mode. (refer to chapter 4.4.5)

<table><tr><th rowspan="2">Mode</th><th rowspan="2">Mode</th><th colspan="2">Mode of contacts</th></tr><tr><th>OFF</th><th>ON</th></tr><tr><td>0</td><td>Torque</td><td>x</td><td>X</td></tr><tr><td>1</td><td>Speed</td><td>x</td><td>X</td></tr><tr><td>2</td><td>Position</td><td>x</td><td>X</td></tr><tr><td>3</td><td>Speed/Position</td><td>Position</td><td>Speed</td></tr><tr><td>4</td><td>Speed/Torque</td><td>Torque</td><td>Speed</td></tr><tr><td>5</td><td>Position/Torque</td><td>Torque</td><td>Position</td></tr></table>
※ When mode is 3, 4
- Even though [PE-320](0SPD torque improved) is set as "1" under mode no. 3,4, [PE-320](0SPD torque improved) is not applied.</td><td>PST</td></tr>
<tr><td>121</td><td>PE-602</td><td>Speed Command1</td><td>[r/min]
-6000</td><td>200
6000</td><td rowspan="3">Speed command input contacts is defined by the combination of SPEED1 / SPEED2.

<table><tr><th>SPD1</th><th>SPD2</th><th>속도 지령</th></tr><tr><td>OFF</td><td>OFF</td><td>Analog speed com.</td></tr><tr><td>ON</td><td>OFF</td><td>Digital speed com.1</td></tr><tr><td>OFF</td><td>ON</td><td>Digital speed com.2</td></tr><tr><td>ON</td><td>ON</td><td>Digital speed com.3</td></tr></table>
※ SPD1, 2 contacts is used as speed limit under the torque mode.</td><td>ST</td></tr>
<tr><td>122</td><td>PE-603</td><td>Speed Command2</td><td>[r/min]
-6000</td><td>1000
6000</td><td>ST</td></tr>
<tr><td>123</td><td>PE-604</td><td>Speed Command3</td><td>[r/min]
-6000</td><td>3000
6000</td><td>ST</td></tr>
<tr><td>124</td><td>PE-605</td><td>Not Used</td><td></td><td></td><td></td><td></td></tr>
<tr><td>125</td><td>PE-606</td><td>Not Used</td><td></td><td></td><td></td><td></td></tr>
</table>

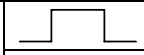
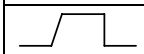
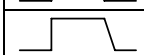
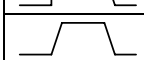
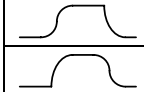
<table>
<tr><td>126</td><td>PE-607</td><td>Z Search
Operation Speed</td><td>[r/min]
1</td><td>10
300</td><td>Set speed for encoder Z phase search operation.

- Setting value for operation of [PC-806].</td><td>S</td></tr>
<tr><td>127</td><td>PE-608</td><td>Manual Position
Operation Speed</td><td>[r/min]
1</td><td>500
6000</td><td>Set speed for manual position operation

- Setting value for operation of [PC-807].</td><td>S</td></tr>
<tr><td>128</td><td>PE-609</td><td>Accel Time</td><td>[ms]
0</td><td>0
10000</td><td>Set Aecel time of speed command.

- Set lead time of Decel from rated speed to Zero Speed. And Unit is [ms].</td><td>S</td></tr>
<tr><td>129</td><td>PE-610</td><td>Decel Time</td><td>[ms]
0</td><td>0
10000</td><td>Set Decel time of speed command.

- Set lead time of Decel from rated speed to Zero Speed. And Unit is [ms].</td><td>S</td></tr>
<tr><td>130</td><td>*PE-611</td><td>S Type Control</td><td>-
0</td><td>0
1</td><td>Set S type control under Speed mode.

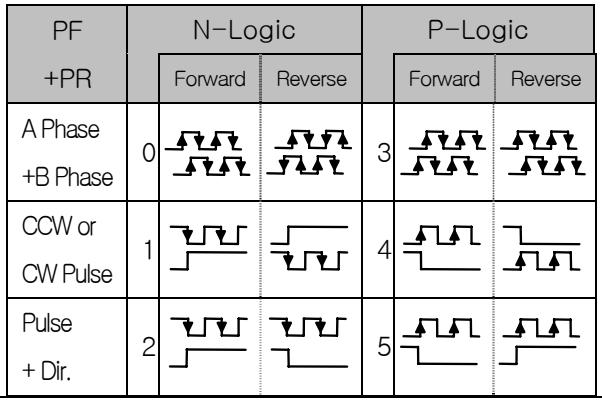
- For smooth operation for Accel/Decel , S type control can be set under Speed Mode.
- Straight type / S type Accel/Decel
<table>
<tr><th>Mode</th><th>Function of Input contacts 6</th></tr>
<tr><td>0</td><td>Straight type Accel/Decel</td></tr>
<tr><td>1</td><td>S type Accel/Decel</td></tr>
</table>
- Accel/Decel Pattern as followed setting command
<table>
<tr><th>PE-609</th><th>PE-610</th><th>PE-611</th><th>Com.</th><th>Accel/Decel com.</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td rowspan="9"> </td><td>  </td></tr>
<tr><td>Accel</td><td>0</td><td>0</td><td>  </td></tr>
<tr><td>0</td><td>Decel</td><td>0</td><td>  </td></tr>
<tr><td>Accel</td><td>Decel</td><td>0</td><td>  </td></tr>
<tr><td>0</td><td>0</td><td>1</td><td> </td></tr>
<tr><td>Accel</td><td>0</td><td>1</td><td> </td></tr>
<tr><td>0</td><td>Decel</td><td>1</td><td>  </td></tr>
<tr><td>Accel</td><td>Decel</td><td>1</td><td> </td></tr>
</table></td><td>S</td></tr>
</table>

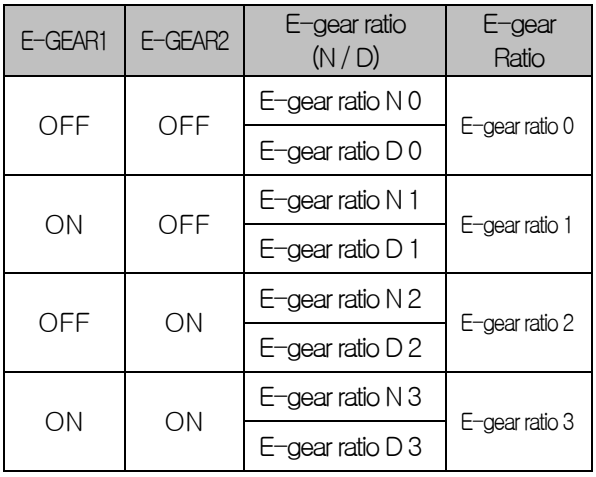
<table>
<tr><td>131</td><td>PE-612</td><td>Test Run Speed0</td><td>[r/min]
-6000</td><td>100.0
+6000</td><td>Set speed 0 for continuous test operation</td><td>PST</td></tr>
<tr><td>132</td><td>PE-613</td><td>Test Run Speed1</td><td>[r/min]
-6000</td><td>-500.0
+6000</td><td>Set speed 1 for continuous test operation</td><td>PST</td></tr>
<tr><td>133</td><td>PE-614</td><td>Test Run Speed2</td><td>[r/min]
-6000</td><td>1000.0
+6000</td><td>Set speed 2 for continuous test operation</td><td>PST</td></tr>
<tr><td>134</td><td>PE-615</td><td>Test Run Speed3</td><td>[r/min]
-6000</td><td>-2000.0
+6000</td><td>Set speed 3 for continuous test operation</td><td>PST</td></tr>
<tr><td>135</td><td>PE-616</td><td>Test Run Time0</td><td>[s]
1</td><td>5
3600</td><td>Set time 0 for continuous test operation</td><td>PST</td></tr>
<tr><td>136</td><td>PE-617</td><td>Test Run Time1</td><td>[s]
1</td><td>5
3600</td><td>Set time 1 for continuous test operation</td><td>PST</td></tr>
<tr><td>137</td><td>PE-618</td><td>Test Run Time2</td><td>[s]
1</td><td>5
3600</td><td>Set time 2 for continuous test operation</td><td>PST</td></tr>
<tr><td>138</td><td>PE-619</td><td>Test Run Time3</td><td>[s]
1</td><td>5
3600</td><td>Set time 3 for continuous test operation</td><td>PST</td></tr>
<tr><td>139</td><td>PE-620</td><td>Inspeed Type</td><td>-
0</td><td>1
1</td><td>Set output type of INSPD output contacts.
<table><tr><th>Mode</th><th>Output type of INSPD output contacts</th></tr><tr><td>0</td><td>Zero Speed output</td></tr><tr><td>1</td><td>Accord speed output</td></tr></table></td><td>S</td></tr>
</table>

4.2.9 Potion Operation Variables Setting Menu

"**" Editing is not allowed under Servo-On & Reset Menu, "*" Editing is not allowed under Servo-On.

<table>
<tr><th colspan="3">MENU</th><th>Unit</th><th>INI</th><th rowspan="2">Description</th><th rowspan="2">Model</th></tr>
<tr><th>Com</th><th>CODE</th><th>NAME</th><th>Min</th><th>Max</th></tr>
<tr><td rowspan="2">140</td><td rowspan="2">*PE-701</td><td rowspan="2">Pulse Logic</td><td>-</td><td>1</td><td rowspan="2">Set Logic of position input pulse.

- Type of position command input pulse and rotation direction for each logic.
 
</td><td rowspan="2">P</td></tr>
<tr><td>0</td><td>5</td></tr>
<tr><td>141</td><td>*PE-702</td><td>Electric Gear N0</td><td>-
1</td><td>1000
30000</td><td rowspan="8">Set Numerator/Denominator for electronic gear ratio 0, 1, 2, 3.

- Electric gear ratio is displayed the relation between position command input pulse and motor encoder pulse(After 4 times of interpolation) as Numerator/Denominator to prevent position operation error.</td><td rowspan="8">P</td></tr>
<tr><td>142</td><td>*PE-703</td><td>Electric Gear D0</td><td>-
1</td><td>1000
30000</td></tr>
<tr><td>143</td><td>*PE-704</td><td>Electric Gear N1</td><td>-
1</td><td>1000
30000</td></tr>
<tr><td>144</td><td>*PE-705</td><td>Electric Gear D1</td><td>-
1</td><td>2000
30000</td></tr>
<tr><td>145</td><td>*PE-706</td><td>Electric Gear N2</td><td>-
1</td><td>1000
30000</td></tr>
<tr><td>146</td><td>*PE-707</td><td>Electric Gear D2</td><td>-
1</td><td>3000
30000</td></tr>
<tr><td>147</td><td>*PE-708</td><td>Electric Gear N3</td><td>-
1</td><td>1000
99999</td></tr>
<tr><td>148</td><td>*PE-709</td><td>Electric Gear D3</td><td>-
1</td><td>4000
30000</td></tr>
<tr><td>149</td><td>PE-710</td><td>Not used</td><td></td><td></td><td></td><td></td></tr>
</table>

<table>
<tr><td rowspan="2">150</td><td rowspan="2">PE-711</td><td rowspan="2">E-Gear Mode</td><td>-</td><td>0</td><td rowspan="2">Set E-Gear Mode.

<table><tr><th>Mode</th><th>Function</th></tr><tr><td>0</td><td>Select E-gear ratio 0~3</td></tr><tr><td>1</td><td>Offset override function to Numerator 0 of E-gear ratio</td></tr></table></td><td rowspan="2">P</td></tr>
<tr><td>0</td><td>1</td></tr>
<tr><td rowspan="2">151</td><td rowspan="2">PE-712</td><td rowspan="2">E-Gear offset</td><td>-</td><td>0</td><td rowspan="2">Set offset value for E-gear ratio Numerator 0.

<table><tr><th>Mode</th><th>Function</th></tr><tr><td>Applied offset value at once</td><td>Set offset value to E-gear N as setting offset value.</td></tr><tr><td>EGEAR1 contacts LOW → HIGH</td><td>Increase setting E-gear ratio N0 value at [PE-712] with amount of “1”.</td></tr><tr><td>EGEAR2 contacts LOW → HIGH</td><td>Decrease setting E-gear ratio N0 value at [PE-712] with amount of “1”.</td></tr></table></td><td rowspan="2">P</td></tr>
<tr><td>-30000</td><td>30000</td></tr>
<tr><td rowspan="2">152</td><td rowspan="2">*PE-713</td><td rowspan="2">Pulse Dir</td><td>-</td><td>0</td><td rowspan="2">Set direction of position pulse.

<table><tr><th>Mode</th><th>Direction</th></tr><tr><td>0</td><td>Commanded direction</td></tr><tr><td>1</td><td>Opposite direction of command</td></tr></table></td><td rowspan="2">P</td></tr>
<tr><td>0</td><td>1</td></tr>
<tr><td rowspan="2">153</td><td rowspan="2">**PE-714</td><td rowspan="2">Position Pulse Accel/Decel Time</td><td>[ms]</td><td>0</td><td rowspan="2">Set position command Accel/Decel time.

- Position pulse Accel/Decel time make smooth operation for rapid change of position command with setting the Time constant of 1st. delayed filter.

- Unit of position command Accel/decal setting range is 1[ms] and the Max. is 100[ms].</td><td rowspan="2">P</td></tr>
<tr><td>0</td><td>100</td></tr>
<tr><td rowspan="2">154</td><td rowspan="2">PE-715</td><td rowspan="2">Not Used</td><td>-</td><td>-</td><td rowspan="2"></td><td rowspan="2"></td></tr>
<tr><td>-</td><td>-</td></tr>
<tr><td rowspan="2">155</td><td rowspan="2">PE-716</td><td rowspan="2">Not Used</td><td>-</td><td>-</td><td rowspan="2"></td><td rowspan="2"></td></tr>
<tr><td>-</td><td>-</td></tr>
</table>

<table>
<tr><td rowspan="2">156</td><td rowspan="2">PE-717</td><td rowspan="2">Manua Position Operation distance</td><td>[turn]</td><td>10.00</td><td rowspan="2">Set target position(distance) as no. of rotation for manual position operation[PC-807].

- The direction of operation is decided by [Left], [Right] under [PC-807] Menu

※This menu is setting value for operation of PC-807.</td><td rowspan="2">PST</td></tr>
<tr><td>0.00</td><td>300.00</td></tr>
<tr><td rowspan="2">157</td><td rowspan="2">PE-718</td><td rowspan="2">Position Limit Pulse Clear</td><td>-</td><td>0</td><td rowspan="2">Set function of Limit contacts CCWLIM, CWLIM.

<table><tr><th>Mode</th><th>Function</th></tr><tr><td>0</td><td>Pulse command is Clear.</td></tr><tr><td>1</td><td>Pulse command is counted.

-under CCWLIM, CWLIM condition, when input pulse command counter is bigger than setting value of [PE-502](position operation following error range), AL-06(Following Error) is displayed.</td></tr></table></td><td rowspan="2">P</td></tr>
<tr><td>0</td><td>1</td></tr>
<tr><td rowspan="2">158</td><td rowspan="2">*PE-719</td><td rowspan="2">ABS Multi Turn</td><td>[2^]</td><td>16</td><td rowspan="2">Display Multi Turn Data of ABS encoder.</td><td rowspan="2">PST</td></tr>
<tr><td>10</td><td>16</td></tr>
<tr><td rowspan="2">159</td><td rowspan="2">*PE-720</td><td rowspan="2">ABS Single Turn</td><td>[2^]</td><td>17</td><td rowspan="2">Display Single Turn data of ABS encoder.</td><td rowspan="2">PST</td></tr>
<tr><td>10</td><td>17</td></tr>
</table>

4.2.10 Operation Menu

"**" Editing is not allowed under Servo-On & Reset Menu, "*" Editing is not allowed under Servo-On.

<table>
<tr><th colspan="3">MENU</th><th>Unit</th><th>INI</th><th rowspan="2">Description</th></tr>
<tr><th>Com</th><th>CODE</th><th>NAME</th><th>Min</th><th>Max</th></tr>
<tr><td>160</td><td>PC-801</td><td>Alarm Reset</td><td>-
_</td><td>-
_</td><td>Alarm reset with display of
"CLEAr", after pressing [Enter].</td></tr>
<tr><td>161</td><td>PC-802</td><td>Alarm His Clear</td><td>-
_</td><td>-
_</td><td>Alarm history ([PA-101] ~ [PA-120]) is clear with display of "CLEAr" after pressing [Enter].</td></tr>
<tr><td>162</td><td>PC-803</td><td>Manual Test Run</td><td>[r/min]
-Min</td><td>-
Max</td><td>Manual Test operation.
<table><tr><th>Step</th><th>KEY</th><th>Description</th></tr><tr><td>1</td><td>[Enter]</td><td>Display test operation speed (PE-602).</td></tr><tr><td>2</td><td>[Up]</td><td>Display [PE-602]~[PE-604] stepwise.
*Display absolute value of speed.</td></tr><tr><td>3</td><td>[Right]</td><td>Motor is operated with forward Dir.</td></tr><tr><td>4</td><td>[Left]</td><td>Motor is operated with reverse Dir.</td></tr><tr><td>5</td><td>[Enter]</td><td>Return to Menu.</td></tr></table>※ When press [Enter] under Alarm condition, 'Err1' is displayed</td></tr>
<tr><td>163</td><td>PC-804</td><td>Auto Test Run</td><td>[r/min]
-Min</td><td>-
-Max</td><td>Start continuous test operation.
<table><tr><th>Step</th><th>KEY</th><th>Description</th></tr><tr><td>1</td><td>[Enter]</td><td>Move to 0~3 automatically.<table><tr><th>Step</th><th>Speed</th><th>Time</th></tr><tr><td>0</td><td>PE-612</td><td>PE-616</td></tr><tr><td>1</td><td>PE-613</td><td>PE-617</td></tr><tr><td>2</td><td>PE-614</td><td>PE-618</td></tr><tr><td>3</td><td>PE-615</td><td>PE-619</td></tr></table></td></tr><tr><td>2</td><td>[Enter]</td><td>Return to Menu.</td></tr></table>※ When press [Enter] under Alarm condition, 'Err1' is displayed</td></tr>
</table>

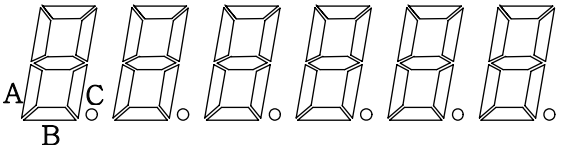
<table>
<tr>
<td rowspan="2">164</td>
<td rowspan="2">PC-805</td>
<td rowspan="2">Gain Tune Run</td>
<td>-</td>
<td>2.0</td>
<td rowspan="2">Start auto tuning operation. (Under developing)
<table>
<tr><th>Step</th><th>KEY</th><th>Description</th></tr>
<tr><td>1</td><td>[Enter]</td><td>Display inertia</td></tr>
<tr><td>2</td><td>[Up]</td><td>Gain tuning starting with 100rpm</td></tr>
<tr><td>3</td><td>[Up]</td><td>Press [Up] key, speed is increased 100->300->500rpm으로 200rpm.</td></tr>
<tr><td>4</td><td>[Right]</td><td>Increase time of repeat operation</td></tr>
<tr><td>5</td><td>[Left]</td><td>Decrease time of repeat operation</td></tr>
<tr><td>6</td><td></td><td>Tuning value is stable => Finish tuning</td></tr>
<tr><td>7</td><td>[Enter]</td><td>Save PE-301,307,309, return Menu</td></tr>
</table>
※ When press [Enter] under Alarm condition, ‘Err1’ is displayed.</td>
</tr>
<tr>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td rowspan="2">165</td>
<td rowspan="2">PC-806</td>
<td rowspan="2">Z POS Search</td>
<td>[turn]</td>
<td>0.00</td>
<td rowspan="2">Start Z signal search operation with setting speed at [PE-607].
<table>
<tr><th>Step</th><th>KEY</th><th>Description</th></tr>
<tr><td>1</td><td>[Enter]</td><td>Enter [Mode] or Release [Mode]</td></tr>
<tr><td>2</td><td>[Left]
or [Right]</td><td>[Left] is CW,[Right] is CCW</td></tr>
<tr><td>3</td><td>[Enter]</td><td>Return to Menu</td></tr>
</table>
※ When CCWLIMIT, CWLIMIT contacts is OFF at start time, this is not operated. Not applied CCWLIMIT, CWLIMIT contact during operating time.
※ When press [Enter] under Alarm condition, ‘Err1’ is displayed.</td>
</tr>
<tr>
<td>0</td>
<td>9.99</td>
</tr>
<tr>
<td rowspan="2">166</td>
<td rowspan="2">PC-807</td>
<td rowspan="2">Manual Position Run</td>
<td>[turn]</td>
<td>-</td>
<td rowspan="2">Move to Setting target position [PE-717] with setting speed [PE-608].
<table>
<tr><th>Step</th><th>KEY</th><th>Description</th></tr>
<tr><td>1</td><td>[Enter]</td><td>Enter [Mode] or Release [Mode]</td></tr>
<tr><td>2</td><td>[Left]
or [Right]</td><td>[Left] is CW,[Right] is CCW</td></tr>
<tr><td>3</td><td>[Up]</td><td>Function for Start & Pause</td></tr>
<tr><td>4</td><td>[Enter]</td><td>Return to Menu</td></tr>
</table>
※ When CCWLIMIT, CWLIMIT contacts is OFF at start time, this is not operated. Not applied CCWLIMIT, CWLIMIT contact during operating time.
※ When press [Enter] under Alarm condition, ‘Err1’ is displayed.</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
</tr>
</table>

<table>
<tr>
<td>167</td>
<td>PC-808</td>
<td>Output Test</td>
<td>-

-</td>
<td>-

-</td>
<td>Set forced ON/OFF of output contact temporarily.

<table>
<tr><th>Step</th><th>KEY</th><th>Description</th></tr>
<tr><td>1</td><td>[Right]</td><td>Increase out0→out1→out2</td></tr>
<tr><td>2</td><td>[Left]</td><td>Decrease out2→out1→out0</td></tr>
<tr><td>3</td><td>[Up]</td><td>Change outx-L ↔ outx-H</td></tr>
<tr><td>4</td><td>[Enter]</td><td>Return to Menu</td></tr>
</table>
-Consist of output contacts [Pd-016]



[Output contacts : Down]
<table>
<tr><th>A : out0</th><th>B : out1</th><th>C : out2</th></tr>
<tr><td>ALARM</td><td>READY/ BRAKE</td><td>INSPD / INPOS</td></tr>
</table>
※ The contacts of out0, 1, 2 are same as A. B, C.
※ With this parameter, can check the wiring condition between servo output contacts and upper controller.</td>
</tr>
<tr>
<td>168</td>
<td>*PC-809</td>
<td>Menu data Init</td>
<td>-

-</td>
<td>-

-</td>
<td>Initialize the menu to shipping condition.

<table>
<tr><th>Step</th><th>KEY</th><th>Description</th></tr>
<tr><td>1</td><td>[Enter]</td><td>Display CLEAr</td></tr>
<tr><td>2</td><td>[Left]
or [Right]</td><td>Return to Menu without initialization</td></tr>
<tr><td>3</td><td>[Up]</td><td>Initialize with display of ALL-CL, then return to Menu automatically.</td></tr>
</table>
※ Don't change [PE-201] ~ [PE-220]
※ Power must turn off/on again.
※ When applied [PC-809], after blackout Menu data initialization[PC-809] is must be needed</td>
</tr>
</table>

<table>
<tr><td rowspan="2">169</td><td rowspan="2">PC-810</td><td rowspan="2">Menu data Lock</td><td>-</td><td>-</td><td rowspan="2">Applied Menu Locking Function.

<table><tr><th>Step</th><th>KEY</th><th>Description</th></tr><tr><td>1</td><td>[Enter]</td><td>Don't edit any menu when Lock/unLock function is applied.</td></tr></table>
※ Lock display: Lock, Unlock display: unlock</td></tr>
<tr><td>-</td><td>-</td></tr>
<tr><td rowspan="2">170</td><td rowspan="2">PC-811</td><td rowspan="2">ABS Encoder set</td><td>-</td><td>-</td><td rowspan="2">Reset Absolute encoder.

<table><tr><th>Step</th><th>KEY</th><th>Description</th></tr><tr><td>1</td><td>[Enter]</td><td>Reset Absolute encoder after displaying "reset" for 5 Sec.</td></tr></table></td></tr>
<tr><td>-</td><td>-</td></tr>
<tr><td rowspan="2">171</td><td rowspan="2">PC-812</td><td rowspan="2">Current Offset Save</td><td>[mA]</td><td>-</td><td rowspan="2">Compensate current offset of Hall-CT.

<table><tr><th>Step</th><th>KEY</th><th>Description</th></tr><tr><td>1</td><td>[Enter]</td><td>Enter [mode] & return Menu</td></tr><tr><td>2</td><td>[Right]</td><td>Display offset of U phase</td></tr><tr><td>3</td><td>[Left]</td><td>Display offset of V phase</td></tr><tr><td>4</td><td>[Up]</td><td>Offset value of U, V is saved at PE-219, 220 then return to Menu</td></tr></table>
※ After checking offset, if press [Enter], return to Menu without saving.</td></tr>
<tr><td>-</td><td>-</td></tr>
<tr><td rowspan="2">172</td><td rowspan="2">PC-813</td><td rowspan="2">Analog Speed Cmd Offset</td><td>[mV]</td><td>-</td><td rowspan="2">Save offset data of analog speed command voltage to [PE-402].

<table><tr><th>Step</th><th>KEY</th><th>Description</th></tr><tr><td>1</td><td>[Enter]</td><td>Display current analog speed command</td></tr><tr><td>2</td><td>[Up]</td><td>Save displayed value as offset of analog speed command voltage to [PE-402]</td></tr><tr><td>3</td><td>[Enter]</td><td>Return Menu without offset value saving</td></tr></table>
※ After checking offset, if press [Enter], return to Menu without saving

※ Applied this parameter when [PE-420] is 1 or 3</td></tr>
<tr><td>-1000</td><td>1000</td></tr>
</table>

<table>
<tr>
<td>173</td>
<td>PC-814</td>
<td>Analog Torque Cmd Offset</td>
<td>[mV]
-1000</td>
<td>-
1000</td>
<td>Save offset of analog torque command voltage to [PE-407] automatically.

<table>
<tr><th>Step</th><th>KEY</th><th>Description</th></tr>
<tr><td>1</td><td>[Enter]</td><td>Display current analog torque command voltage.</td></tr>
<tr><td>2</td><td>[Up]</td><td>Save the displayed value of analog torque command voltage as Offset Data to [PE-407]</td></tr>
<tr><td>4</td><td>[Enter]</td><td>Return menu without saving of offset value.</td></tr>
</table>
※ if want to check offset value only without saving the value, press [Enter].

※ Available, When 2 or 3 of [PE-420] is set</td>
</tr>
<tr>
<td>174</td>
<td>PC-815</td>
<td>Maximum Load</td>
<td>[%]
-300</td>
<td>-
300</td>
<td>Display Max load ratio.

<table>
<tr><th>Step</th><th>KEY</th><th>Description</th></tr>
<tr><td>1</td><td>[Enter]</td><td>At first 00000 is displayed</td></tr>
<tr><td>2</td><td>[Right]</td><td>Display Max. Load for forward Dir.</td></tr>
<tr><td>3</td><td>[Left]</td><td>Display Max. Load for Reverse. Dir.</td></tr>
<tr><td>4</td><td>[Up]</td><td>Clear displayed load rate.
(current displayed value is value of before clear)</td></tr>
<tr><td>5</td><td>[Left]
or
[Right]</td><td>Check Max. load after clear</td></tr>
<tr><td>6</td><td>[Enter]</td><td>Return to Menu</td></tr>
</table>
</td>
</tr>
<tr>
<td>175</td>
<td>PC-816</td>
<td>Feedback Pulse</td>
<td>[pulse]
9.9.9.9.9.9</td>
<td>-
999999</td>
<td>Display following position pulse.

<table>
<tr><th>Step</th><th>KEY</th><th>설명</th></tr>
<tr><td>1</td><td>[Enter]</td><td>At first 00000 is displayed</td></tr>
<tr><td>2</td><td>[Up]</td><td>Clear displayed following position pulse.</td></tr>
<tr><td>3</td><td>[Enter]</td><td>Return to menu.</td></tr>
</table>
※ ‘.’ Means reversed direction.</td>
</tr>
</table>

<table>
<tr><td>176</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>177</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>178</td><td></td><td></td><td>–</td><td>–</td><td></td></tr>
<tr><td>179</td><td>*PC-820</td><td>All Menu Data Init</td><td>–</td><td>–</td><td>Initialize all menu data to O/S download value.

<table><tr><th>Step</th><th>KEY</th><th>Description</th></tr><tr><td>1</td><td>[Enter]</td><td>Enter Mode</td></tr><tr><td>2</td><td>[Up]</td><td>Initialized with display of “ALL-CL” then return to Menu</td></tr></table>
※ This parameter initialize all condition to O/S download default value, so the parameter which is set before shipment in needed to set again.
(Caution) Don’t set as maker’s setting menu</td></tr>
</table>

Chapter 5

Operation

5.1 Check items before operation

5.1.1 Wiring ····· 5-2
5.1.2 Operating signal (CN1) wiring ····· 5-2
5.1.3 Working circumstances····· 5-2
5.1.4 The condition of machine ····· 5-2
5.1.5 Menu variables ····· 5-2

5.2 Operation

5.2.1 Alarm rest ····· 5-3
5.2.2 Alarm history clear ····· 5-3
5.2.3 Menu reset ····· 5-3
5.2.4 Menu lock ····· 5-3
5.2.5 Setting input contact point logic ····· 5-4
5.2.6 Setting output contact point logic·····5-5
5.2.7 Setting forced ON/OFF of output contacts logic ····· 5-6

5.2 Adjustment

5.3.1 Adjusting current offset ····· 5-7
5.3.2 Adjusting analog speed voltage offset·····5-7
5.3.3 Adjusting analog torque voltage offset····· 5-8

5.4 Test run

5.4.1 Hand-operated run ····· 5-9
5.4.2 Continuous test run ····· 5-9
5.4.3 Z position run ····· 5-10
5.4.4 Manual position operation ····· 5-10

5.1 Check items before operation

Check the below to avoid the accident and breakage of the product.

5.1.1 Wiring

(1) Check if the proper voltage(AC200[V]) was applied to the power input terminal

(2) Check if the power cables (U,V,W ground) between a drive and a motor are connected correctly

(3) Check if the voltage 24[V] is connected to the control signal properly

(4) Check if the regenerative resistor is proper capacity with good connection

(5) Check if the wiring cable is curved severely or excessive pressure is applied

(6) Check if the status of ground and shield are OK

5.1.2 Operating signal (CN1) wiring

Refer to the below for the status of wiring of operating signal and contact points

Pin No.	Pin name	Status of contact points	Pin No.	Pin name	Status of contact points
30	SVON	OFF	35	STOP	OFF
31	CCWLIM	ON	32	CWLIM	ON

Note) The name of signal can be different depending on the operation mode

5.1.3 Working circumstances

Check if there is metal dust or moisture in the wiring part

5.1.4 The conditions of machine

(1) Check if the coupling of servo motor is OK

(2) Check if the connected bolts are loosen or detached

(3) Check if there is obstacle in the driving area

5.1.5 Menu variables

(1) Check the motor ID setting [PE-201]

(2) Check the encoder setting [PE-204]

(3) Check if control gain [PE-301], [PE-302], [PE-307],[PE-309]are set properly

5.2 Operation

5.2.1 Alarm reset

- Contact points alarm reset : If you turn the driving signal (CN1) 'ALMRST' "ON", the status of alarm will be reset and become to normal condition.
- Operation menu rest : If you press [Enter] at alarm rest menu [PC-801], "CLEAr" will be displayed and alarm will be reset and become to normal condition

※ If the alarm still remains even after reset, check the factors and remove the main causes, then try it again.

5.2.2 Alarm history clear

If you press [Enter] at alarm history menu [PC-802], "CLEAr" will be displayed and the alarm history will be cleared

(Note) 20pcs of alarm history is saved in serial from the recent one at [PA-101]to [PA-120]

5.2.3 Menu reset

If you press [Up] after pressing [Enter] at [PC-809], every variables will be changed into the initial values except the valuables on system [PE-201]~[PE-220]

(Note) You have to apply the power after turning off the power to change the variables into the initial one

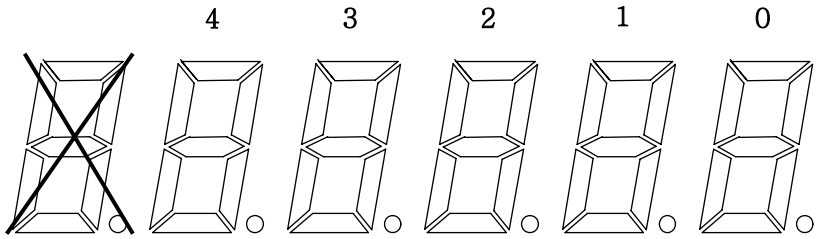
5.2.4 Menu lock

If you press [Enter] at [PC-810], "Lock" will be displayed. When you try to edit menu data, the manipulation will be prohibited with "Err3" message. To clear it, if you press [Enter] one more time at [PC-810], the status of Menu Lock will be cleared with "unLock" message

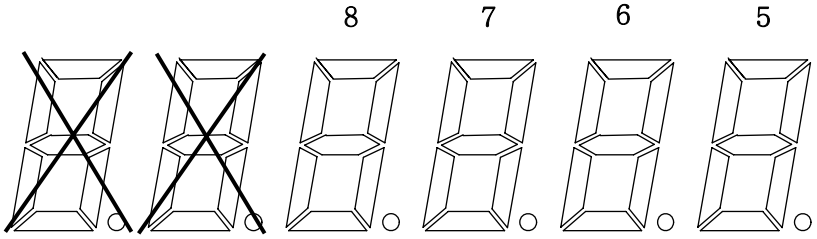
5.2.5 Setting input contact point logic

You can set the status of input contact point at 0~4 logic setting menu [PE-517], 5~8 logic setting menu [PE-518].

[PE-517]: Setting input contact points 0~6 logic



[PE-518] Setting input contact points 5~8 logic



The input contact point is displayed as below

No.	0	1	2	3	4	5	6	7	8
Contact point	SVON	ALMRST	CCWLIM	CWLIM	STOP	DIR	MODE/ TRQLIM	SPD1 / EGEAR 1	SPD2 / EGEAR 2

Select the position of the input contact points by operating [Left] and [Right] key and set 0 or 1 by pressing [Up] key.

“0” : CN1 driving signal is operated through Normal A contact point

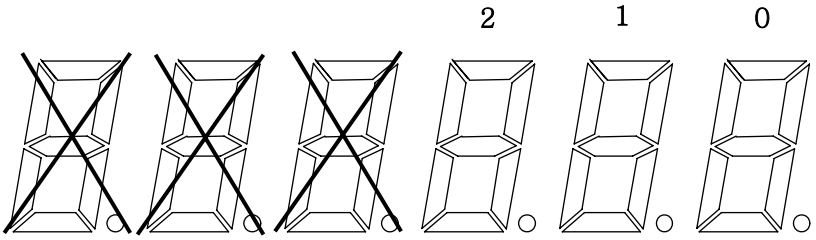
“1” : CN1 driving signal is operated through Normal B contact point.

Note) If you repeat to turn on/off the power, the fixed input contact points will remain in the same way as before

5.2.6 Setting output contact point logic

You can set the status of output contact point logic at output contact point 0~2 logic setting menu [PE-515].

[PE-515] : Setting output contact point 0~2



The output contact point logic is displayed as below.

0	1	2
ALARM	READY / BRAKE It can be selected at [PE-508]	INSPD / INPOS

Select the position of output contact point by manipulating [Left] & [Right] key and set 0 or 1 by pressing [Up] key.

"0" : CN1 driving signal is operated through Normal A contact point

"1" : CN1 driving signal is operated through Normal B contact point

Note) If you repeat to turn on/off the power, the fixed input contact points will remain in the same way as before

5.2.7 Setting forced ON/OFF of output contacts logic

You can check if the output point of servo is connected to the upper controller properly by using the function, forced ON/OFF of output contacts logic

If you press [Enter] at forced ON/OFF of output contacts logic setting menu, “out1-L” will be displayed. When you select the position of output contact point by manipulating [Left] & [Right] key and press [Up] key, it will be changed into “out1-H” and you can alter the logic status of output points temporarily.

Refer to the below for key function and display of output points.

- The function of [Right], [Left], [Up], [Enter]

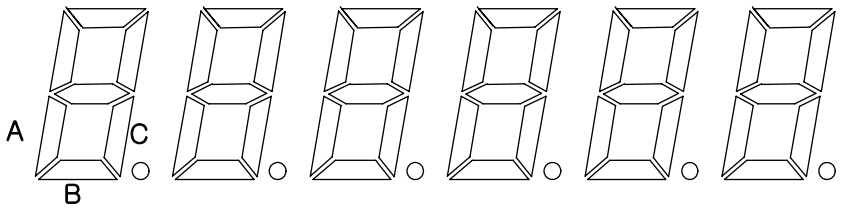
KEY	Description
[Right]	out0 → out1 → out2 → out0 moving into increase direction
[Left]	out2 → out1 → out0 → out2 moving into decrease direction
[Up]	outx-L ↔ outx-changed into H
[Enter]	Return to menu

- Display and the kinds of output points

out0	out1	out2
ALARM	READY / BRAKE It can be selected at [PE-508]	INSPD / INPOS

※ The contact points which come under out0, out1, out2 are same as the status of input/output contact points, A, B, C displayed at [Pd-016]

- [Pd-016] : Displaying the status of input/output



When you select the output contact point by manipulating [Left]& [Right] key and press [Up] key, the output contact point will be changed like L ↔ H

“outx-L ” : The contact point is OFF
“outx-H” : The contact point is ON

Note) If you turn ON/OFF the power, it will be returned to the initial status which was set at [PE-515]

5.3 Adjustment

5.3.1 Adjusting current offset

When you adjust the offset of internal current sensor which is installed in servo drive, you are requested not to adjust the offset value which was set initially. If you have wrong value, the control of servo will be unstable.

In case of download or S/W upload, you should set offset.

- How to adjust offset
  - ① Turn ON the power of servo
  - ② SVOFF after continuous operation/stop under SVON or forward/backward operation for 10 seconds
  - ③ Turn OFF the power of servo and turn it ON
  - ④ When you press [Enter] key at [PC-812] and press [Right],[Left] key, the offset of U, V phase will be displayed.
  - ⑤ If you press [Up] key, the offset value will be saved and return to the menu.
  - ⑥ Repeat the step ②~⑤ (about 5 times)
  - ⑦ If you press [Left], the offset value of U phase will be displayed and if you press , [Right] key, the offset of V phase will be displayed.
    In case that there is too much difference among the values after turning ON/OFF the power, save the tuning vale by pressing [Up] key
  - ⑧ If you press [Enter], it will return to the menu screen without saving the tuning value

5.3.2 Adjusting analog speed voltage offset

You can adjust the voltage offset of analog speed command automatically as below.

- ① Apply the voltage which standardizes the zero speed from upper controller
- ② Input 2 at [PE-420] to activate the automatic adjustment function for analog speed command offset.
- ③ When you press [Enter] key at [PC-813], the voltage of the current analog speed command will be displayed
- ④ The current value will be applied to the Offset data of analog speed command voltage
- ⑤ If you press [Up] key, the offset value will be saved at [PE-402] and return to the menu
- ⑥ The current offset voltage will be the standard of zero speed

5.3.3 Adjusting analog torque voltage offset

You can adjust the voltage offset of analog torque as below.

① Apply the voltage which standardizes the zero torque from upper controller

② Input 2 at [PE-420] to activate the automatic adjustment function for analog torque command offset.

③ When you press [Enter] key at [PC-813], the voltage of the current analog torque command will be displayed

④ The current value will be applied to the Offset data of analog torque command voltage

⑤ If you press [Up] key, the offset value will be saved at [PE-407] and return to the menu

⑥ The current offset voltage will be the standard of zero torque.

Note) Please be noted that the voltage offset of analog speed/torque are 0 initially. The adjustment should be preformed under Servo OFF and do not adjust it during operation

5.4 Test run

5.4.1 Hand operated run

① Press [Enter] key at [pc-803]

② Then, all alarm history will be cleared and the test run speed will be displayed. If the alarm is not cleared, try it again after checking the wiring and other factors of the alarm.

③ When you press[Up] key, the speed of test run has been changed.
The speed which is saved at [PE-602]~[PE-604] will be displayed in serial.

④ If you press [Left] key, the current speed will be displayed and the motor will be rotated in the reverse direction

⑤ When you press [Right] key, the current speed will be displayed and the motor will be rotated in forward direction.

⑥ If you press [Enter] key, the test run will be terminated and return to the menu screen

5.4.2 Continuous test run

① Set the operating speed and time for continuous test run at [PE-612] ~ [PE-619]

② Press [Enter] key at [PC-804]

③ Then, every alarm will be cleared and servo will start to be operated. In case that the alarm is not cleared, try it again after checking the wiring and other factors of the alarm.

④ The operation step will be repeated continuously from 0 to 3 and you can set the operation speed and time at the below menu.

Step	Speed	Time
0	[PE-612]	[PE-616]
1	[PE-613]	[PE-617]
2	[PE-614]	[PE-618]
3	[PE-615]	[PE-619]

5.4.3 Z position run

① Set the speed for Z position run at [PE-607]

② Press [Enter] key at [PC-806]

③ If you press [Left] key, the motor will be operated in CW direction and if you press [Right] key, it will be operated in CCW direction

④ If you press [Enter] key, it will return to menu.

※ This function is useful to assemble the position of Z phase.

5.4.4 Manual position operation

① Set the manual position operation speed at [PE-608] and set the no. of rotation at [PE-717]

② Press [Enter] key at [PC-807]

③ Press [Left]-CW, [Right]-CCW to set the rotating direction

④ If you press [Up] key, the motor will star to be operated. If you press [Up] key during rotation, it will be paused. The no. of rotation will be displayed.

⑤ If you press [Enter] key, it will return to menu after the motor stops

※ When CCWLIMIT, CWLIMIT contacts is OFF at start time, this is not operated. Not applied CCWLIMIT, CWLIMIT contact for operating time.

※ The function is useful to convert the operation distance into the no. of rotation when you assemble the equipment

Chapter 6

Product Specification

6.1 Servo Motor

6.1.1 Features ····· 6-2

6.1.2 External Dimensions ····· 6-12

6.2 Servo Drive

6.1.1 Features ····· 6-19

6.1.2 External Dimensions ····· 6-20

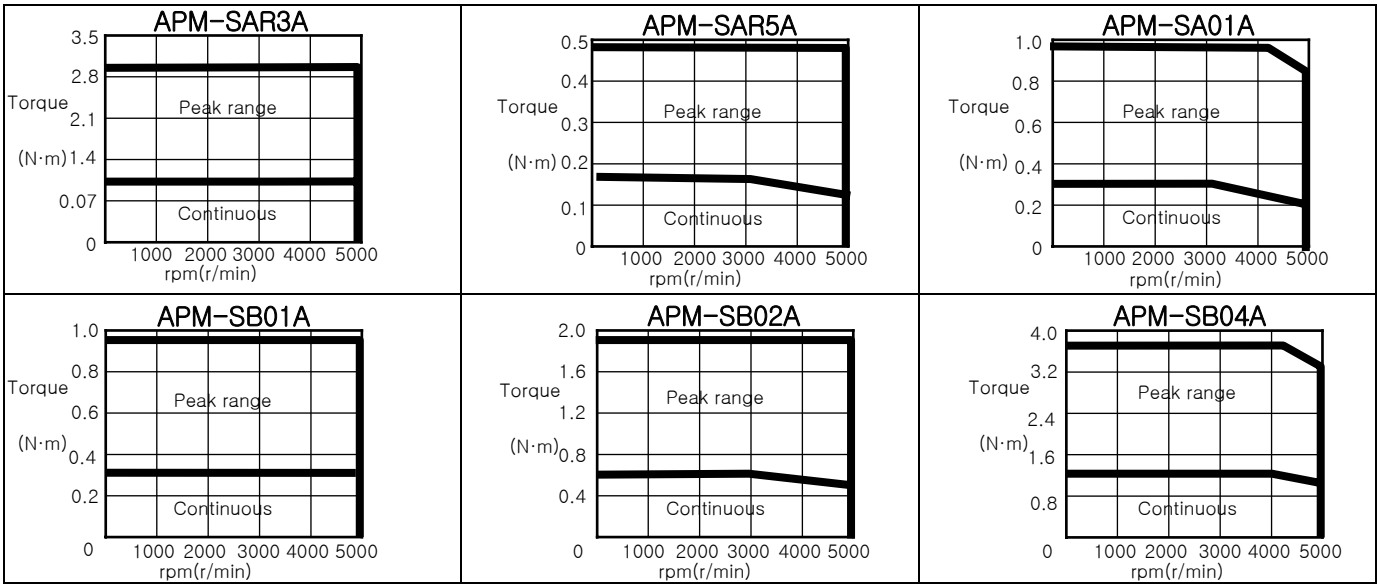
6.3 Option and peripherals ····· 6-21

6.1 Servo Motor

6.1.1 Product Features

Servo Motor Model (APM-□□□□□)		SAR3A	SAR5A	SA01A	SB01A	SB02A	SB04A
Applicable drive (APD-□□□□)		VN01				VN02	VN04
Rated Output	[kW]	0.03	0.05	0.1	0.1	0.2	0.4
Rated Torque	[N·m]	0.095	0.159	0.318	0.318	0.637	1.274
	[kgf·cm]	0.97	1.62	3.25	3.25	6.50	13.0
Maximum Instantaneous Torque	[N·m]	0.286	0.477	0.955	0.955	1.912	3.822
	[kgf·cm]	2.92	4.87	9.74	9.74	19.5	39.0
Rated rpm	[r/min]	3,000					
Maximum rpm	[r/min]	5,000					
Inertia	[kg·m^{2}x10^{-4}]	0.011	0.021	0.045	0.114	0.182	0.321
	[gf·cm·s^2]	0.0112	0.0214	0.0459	0.116	0.186	0.327
Allowable load inertia ratio		30 times of motor inertia			20 times of motor inertia		
Rated power rate	[kW/s]	5.57	10.52	23.80	8.92	22.26	50.65
Speed/Position Detector	Standard	Incremental 2,048[P/R]			Incremental 2,500[P/R]		
	Option	Serial Inc. 17 ~ 21[bit]					
Specification & Features	Structure	Totally enclosed·Non ventilated IP55(Excluding the shaft-through section and connectors)					
	Rated time	Continuous					
	Ambient temp	0~+40[°C]					
	Ambient humidity	20~80[%](Avoid freezing)					
	Atmosphere	Avoid direct sunlight, no corrosive gas, inflammable gas, oil mist, or dust					
	E/V	Elevation/Vibration 49[m/s^2](5G)					
Weight	[kg]	0.3	0.4	0.52	0.84	1.11	1.63

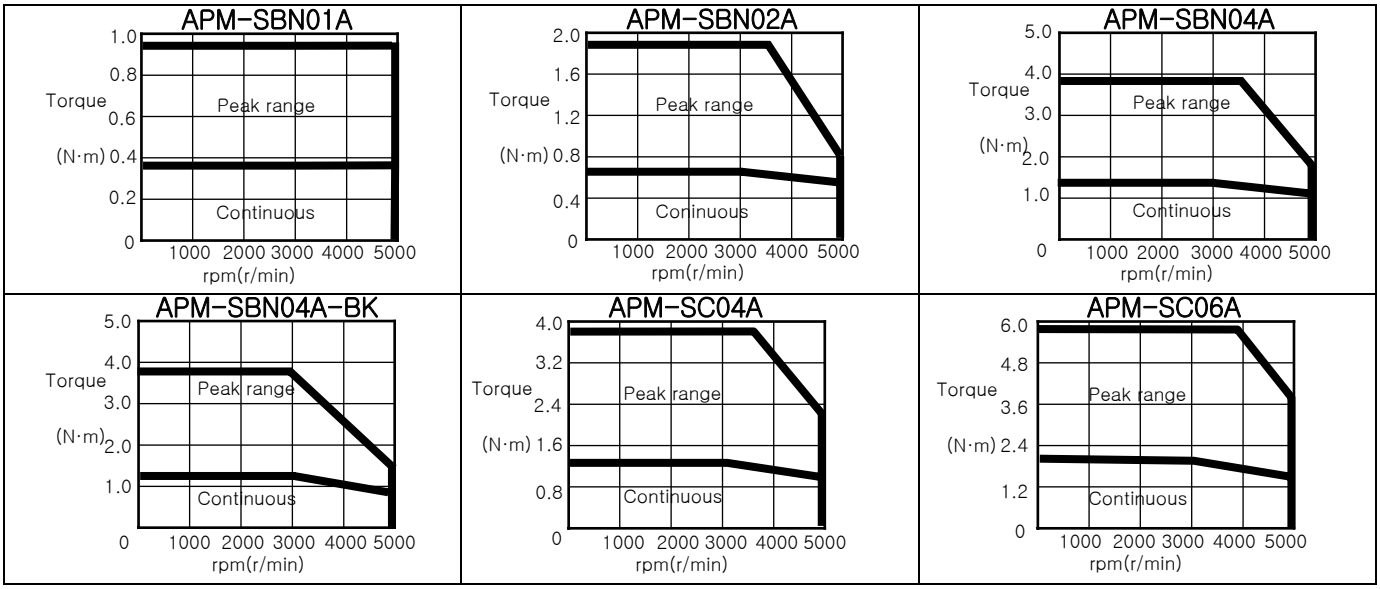
♦ Speed-Torque characteristics ♦



■ Product Features

Servo Motor Model (APM-□□□□□)		SBN01A	SBN02A	SBN04A	SBN04A-BK	SC04A	SC06A
Applicable drive (APD-□□□□)		VN01	VN02	VN04			
Rated Output	[kW]	0.1	0.2	0.4	0.4	0.4	0.6
Rated Torque	[N·m]	0.318	0.637	1.273	1.273	1.27	1.91
	[kgf·cm]	3.25	6.49	12.99	12.99	13.0	19.5
Maximum Instantaneous Torque	[N·m]	0.955	1.910	3.82	3.82	3.82	5.34
	[kgf·cm]	9.74	19.48	38.96	38.96	39.0	54.5
Rated rpm	[r/min]	3,000					
Maximum rpm	[r/min]	5,000					
Inertia	[kg·m^{2}x10^{-4}]	0.014	0.182	0.322	0.254	0.674	1.092
	[gf·cm·s^2]	0.116	0.186	0.328	0.259	0.687	1.114
Allowable load inertia ratio		20 times of motor inertia				15 times of motor inertia	
Rated power rate	[kW/s]	8.91	22.22	50.41	63.84	24.07	33.45
Speed/Position Detector	Standard	Incremental 5[V] Line Drive 3,000[P/R]				2,500[P/R]	
	Option	Serial Inc. 17 ~ 21[bit]					
Specification & Features	Structure	Totally enclosed·Non ventilated IP55(Excluding the shaft-through section and connectors)					
	Rated time	Continuous					
	Ambient temp	0~+40[°C]					
	Ambient humidity	20~80[%](Avoid freezing)					
	Atmosphere	Avoid direct sunlight, no corrosive gas, inflammable gas, oil mist, or dust					
	E/V	Elevation/Vibration 49[m/s^2](5G)					
Weight	[kg]	0.84	1.11	1.63	1.63	1.85	2.49

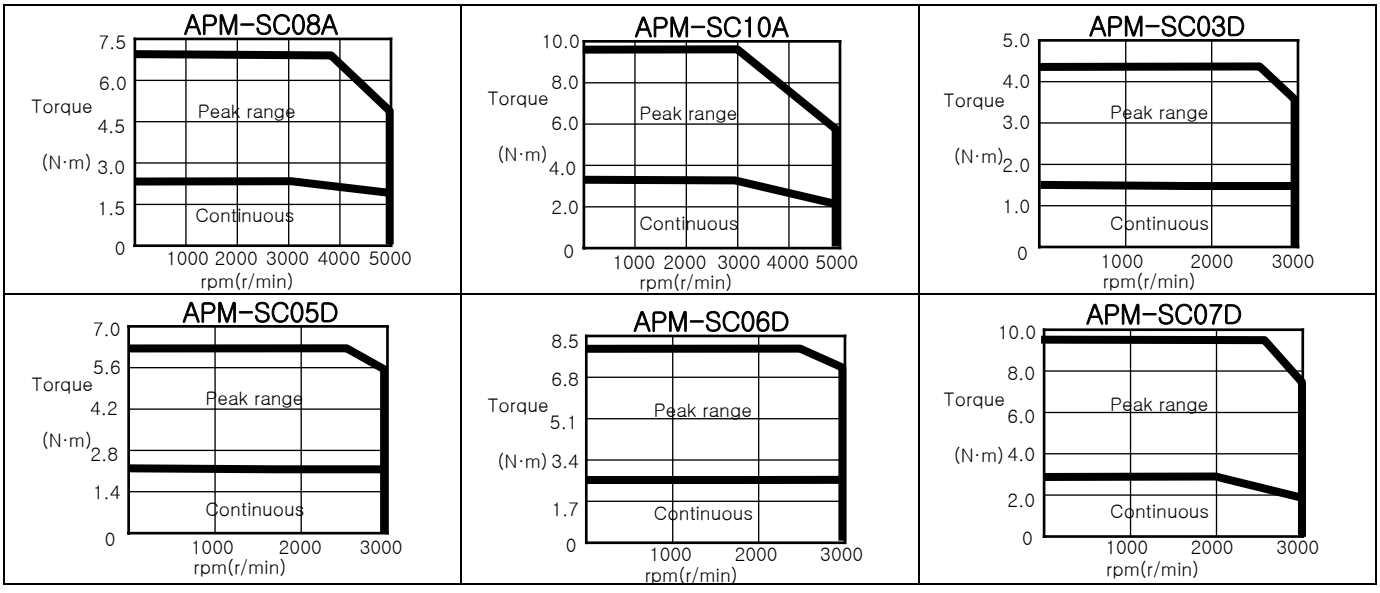
♦ Speed-Torque characteristics ♦



■ Product Features

Servo Motor Model (APM-□□□□□)		SC08A	SC10A	SC03D	SC05D	SC06D	SC07D
Applicable drive (APD-□□□□)		VN07	VN10	VN04		VN07	
Rated Output	[kW]	0.8	1.0	0.3	0.45	0.55	0.65
Rated Torque	[N·m]	2.55	3.19	1.43	2.15	2.63	3.09
	[kgf·cm]	26.0	32.5	14.6	21.9	26.8	31.6
Maximum Instantaneous Torque	[N·m]	6.88	9.56	4.29	6.44	7.88	9.29
	[kgf·cm]	70.2	97.5	43.8	65.7	80.4	94.8
Rated rpm	[r/min]	3,000		2,000			
Maximum rpm	[r/min]	5,000		3,000			
Inertia	[kg·m^{2}x10^{-4}]	1.509	1.927	0.674	1.092	1.509	1.927
	[gf·cm·s^2]	1.539	1.966	0.687	1.114	1.539	1.966
Allowable load inertia ratio		15 times of motor inertia					
Rated power rate	[kW/s]	43.02	52.65	30.36	42.19	43.68	47.90
Speed/Position Detector	Standard	Incremental 5[V] Line Drive 2,500[P/R]				2,500[P/R]	
	Option	Serial Inc. 17 ~ 21[bit]					
Specification & Features	Structure	Totally enclosed·Non ventilated IP65(Excluding the shaft-through section and connectors)					
	Rated time	Continuous					
	Ambient temp	0~+40[°C]					
	Ambient humidity	20~80[%](Avoid freezing)					
	Atmosphere	Avoid direct sunlight, no corrosive gas, inflammable gas, oil mist, or dust					
	E/V	Elevation/Vibration 49[m/s^2](5G)					
Weight	[kg]	3.15	3.80	1.85	2.49	3.15	3.80

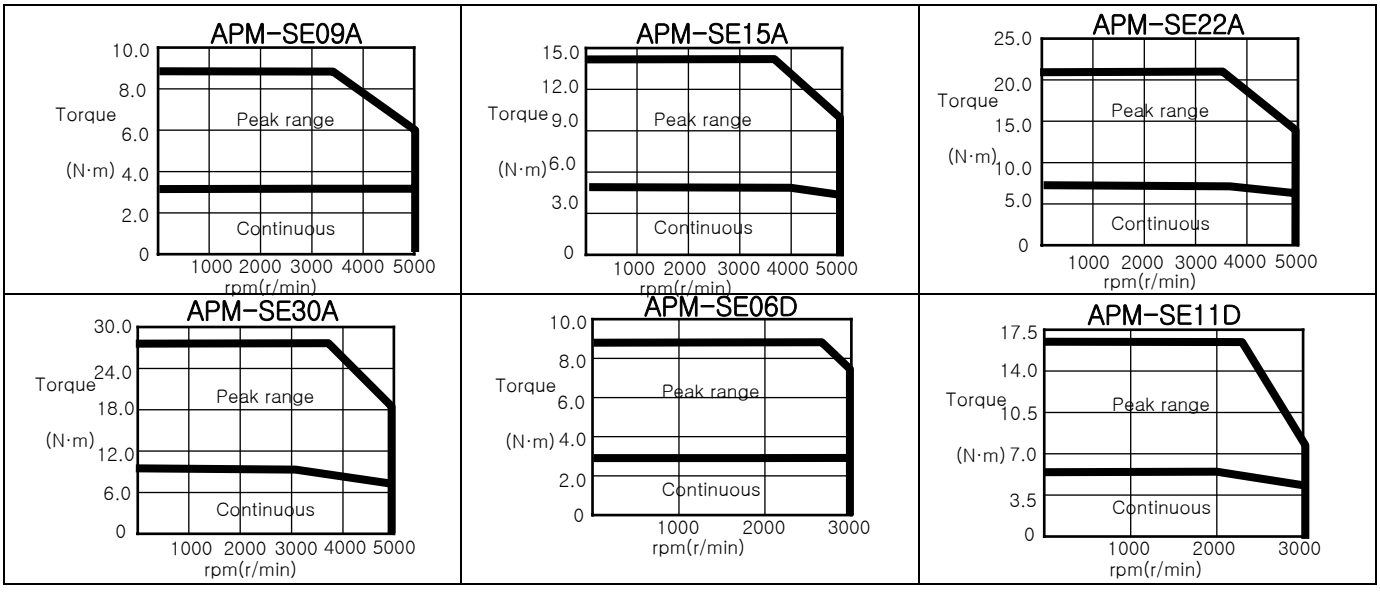
♦ Speed-Torque characteristics ♦



■ Product Features

Servo Motor Model (APM-□□□□□)		SE09A	SE15A	SE22A	SE30A	SE06D	SE11D
Applicable drive (APD-□□□□)		VN10	VN15	VN20	VN35	VN07	VN10
Rated Output	[kW]	0.9	1.5	2.2	3.0	0.6	1.1
Rated Torque	[N·m]	2.86	4.77	7.0	9.55	2.86	5.25
	[kgf·cm]	29.2	48.7	71.4	97.4	29.2	53.6
Maximum Instantaneous Torque	[N·m]	8.59	14.32	21.01	28.65	8.59	15.75
	[kgf·cm]	87.7	146.1	214.3	292.2	87.7	160.7
Rated rpm	[r/min]	3,000				2,000	
Maximum rpm	[r/min]	5,000				3,000	
Inertia	[kg·m^{2}x10^{-4}]	6.659	11.999	17.339	22.679	6.659	11.999
	[gf·cm·s^2]	6.792	12.238	17.685	23.132	6.792	12.238
Allowable load inertia ratio		10 times of motor inertia					
Rated power rate	[kW/s]	12.31	18.98	28.25	40.17	12.31	22.97
Speed/Position Detector	Standard	Incremental 5[V] Line Drive 3,000[P/R]					
	Option	Serial Inc. 17 ~ 21[bit]					
Specification & Features	Structure	Totally enclosed·Non ventilated IP65(Excluding the shaft-through section and connectors)					
	Rated time	Continuous					
	Ambient temp	0~+40[°C]					
	Ambient humidity	20~80[%](Avoid freezing)					
	Atmosphere	Avoid direct sunlight, no corrosive gas, inflammable gas, oil mist, or dust					
	E/V	Elevation/Vibration 49[m/s^2](5G)					
Weight	[kg]	5.6	7.2	8.7	10.2	5.6	7.2

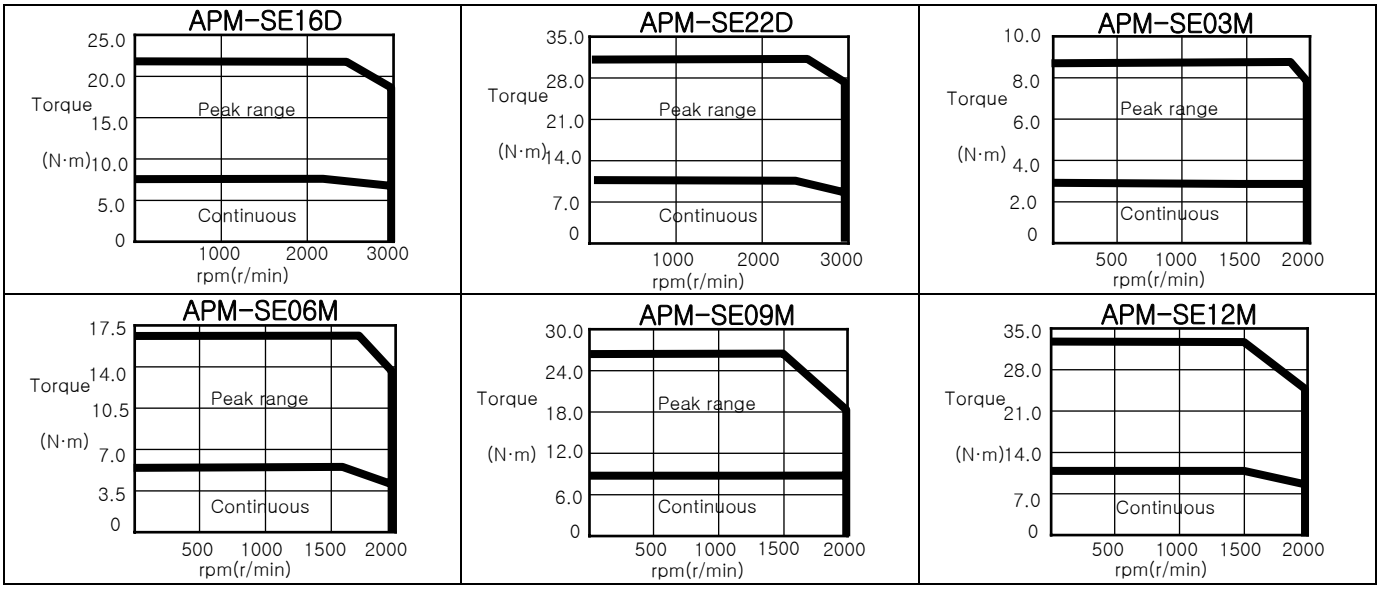
♦ Speed-Torque characteristics ♦



■ Product Features

Servo Motor Model (APM-□□□□□)		SE16D	SE22D	SE03M	SE06M	SE09M	SE12M
Applicable drive (APD-□□□□)		VN15	VN20	VN04	VN07	VN10	VN15
Rated Output	[kW]	1.6	2.2	0.3	0.6	0.9	1.2
Rated Torque	[N·m]	7.63	10.5	2.86	5.72	8.59	11.46
	[kgf·cm]	77.9	107.1	29.2	58.4	87.7	116.9
Maximum Instantaneous Torque	[N·m]	22.92	31.51	8.59	17.18	25.77	34.22
	[kgf·cm]	233.8	321.4	87.7	175.3	262.9	349.1
Rated rpm	[r/min]	2,000		1,000			
Maximum rpm	[r/min]	3,000		2,000			
Inertia	[kg·m^{2}x10^{-4}]	17.339	22.679	6.659	11.999	17.339	22.679
	[gf·cm·s^2]	17.685	23.132	6.792	12.238	17.685	23.132
Allowable load inertia ratio		10 times of motor inertia					
Rated power rate	[kW/s]	33.63	48.61	12.31	27.34	42.56	57.85
Speed/Position Detector	Standard	Incremental 5[V] Line Drive 3,000[P/R]					
	Option	Serial Inc. 17 ~ 21[bit]					
Specification & Features	Structure	Totally enclosed·Non ventilated IP65(Excluding the shaft-through section and connectors)					
	Rated time	Continuous					
	Ambient temp	0~+40[°C]					
	Ambient humidity	20~80[%](Avoid freezing)					
	Atmosphere	Avoid direct sunlight, no corrosive gas, inflammable gas, oil mist, or dust					
	E/V	Elevation/Vibration 49[m/s^2](5G)					
Weight	[kg]	8.7	10.2	5.6	7.2	8.7	10.2

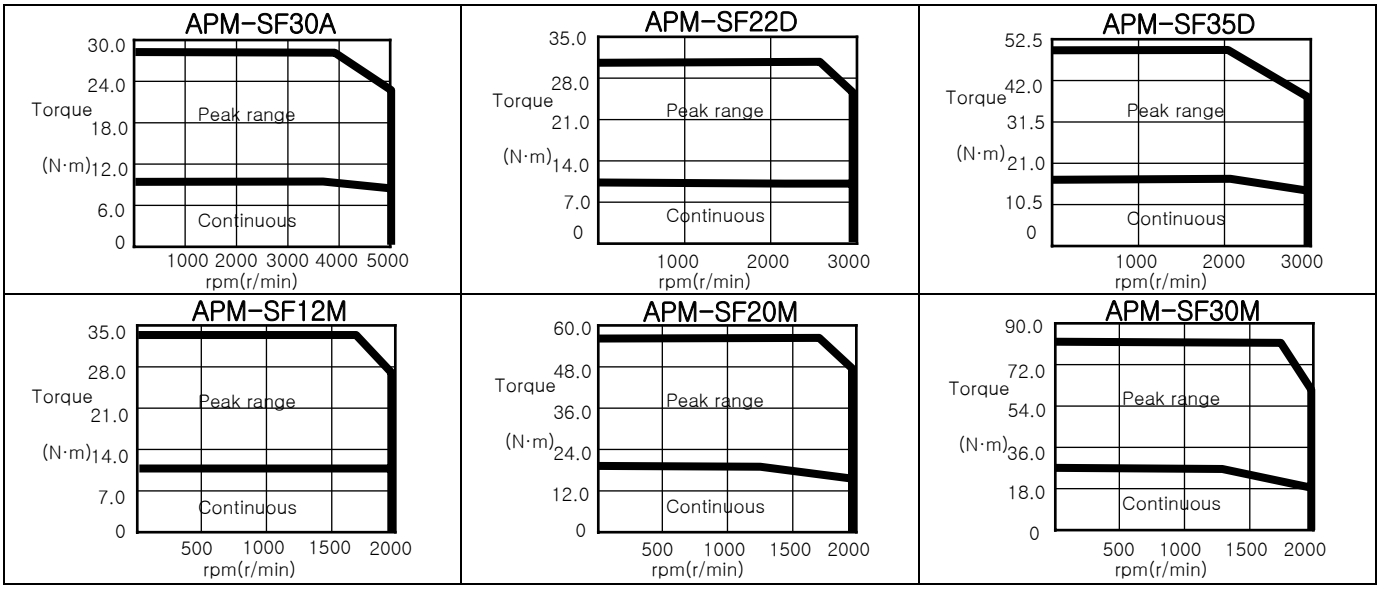
♦Speed-Torque characteris♦



■ Product Features

Servo Motor Model (APM-□□□□□)		SF30A	SF22D	SF35D	SF12M	SF20M	SF30M
Applicable drive (APD-□□□□)		VN30	VN20	VN35	VN15	VN20	VN30
Rated Output	[kW]	3.0	2.2	3.5	1.2	2.0	3.0
Rated Torque	[N·m]	9.55	10.5	16.7	11.46	19.09	28.64
	[kgf·cm]	97.4	107.1	170.4	116.9	194.8	292.2
Maximum Instantaneous Torque	[N·m]	28.64	31.5	50.12	34.38	57.29	85.94
	[kgf·cm]	292.2	321.3	511.3	350.7	584.4	876.6
Rated rpm	[r/min]	3,000	2,000		1000		
Maximum rpm	[r/min]	5,000	3,000		2000		
Inertia	[kg·m^{2}x10^{-4}]	30.74	30.74	52.13	30.74	52.13	83.60
	[gf·cm·s^2]	31.35	31.35	53.16	31.35	53.16	85.24
Allowable load inertia ratio		5 times of motor inertia					
Rated power rate	[kW/s]	29.66	35.88	53.56	42.70	69.96	98.16
Speed/Position Detector	Standard	Incremental 5[V] Line Drive 3,000[P/R]					
	Option	Serial Inc. 17 ~ 21[bit]					
Specification & Features	Structure	Totally enclosed·Non ventilated IP65(Excluding the shaft-through section and connectors)					
	Rated time	Continuous					
	Ambient temp	0~+40[°C]					
	Ambient humidity	20~80[%](Avoid freezing)					
	Atmosphere	Avoid direct sunlight, no corrosive gas, inflammable gas, oil mist, or dust					
	E/V	Elevation/Vibration 49[m/s^2](5G)					
Weight	[kg]	12.4	12.4	17.7	12.4	17.7	26.3

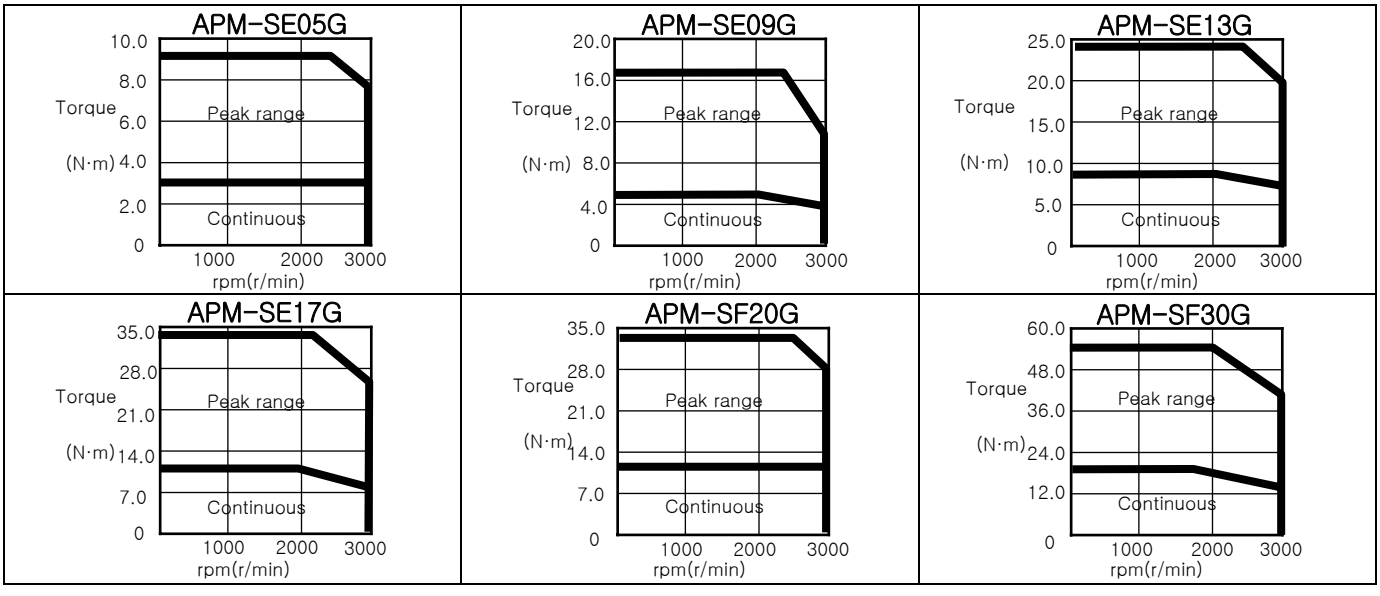
♦ Speed-Torque characteris ♦



■ Product Features

Servo Motor Model (APM-□□□□□)		SE05G	SE09G	SE13G	SE17G	SF20G	SF30G
Applicable drive (APD-□□□□)		VN07	VN10	VN15	VN20		VN30
Rated Output	[kW]	0.45	0.85	1.3	1.7	1.8	2.9
Rated Torque	[N·m]	2.86	5.41	8.27	10.82	11.45	18.46
	[kgf·cm]	29.22	55.19	84.41	110.38	116.88	188.3
Maximum Instantaneous Torque	[N·m]	8.59	16.23	24.82	32.46	34.37	55.38
	[kgf·cm]	87.66	165.57	253.23	331.14	350.6	564.9
Rated rpm	[r/min]	1,500					
Maximum rpm	[r/min]	3,000					
Inertia	[kg·m^{2}x10^{-4}]	6.659	11.999	17.339	22.679	30.74	52.13
	[gf·cm·s^2]	6.792	12.238	17.685	23.132	31.35	53.16
Allowable load inertia ratio		10 times of motor inertia				5 times of motor inertia	
Rated power rate	[kW/s]	12.28	24.39	39.54	51.61	42.70	65.36
Speed/Position Detector	Standard	Incremental 5[V] Line Drive 3,000[P/R]					
	Option	Serial Inc. 17 ~ 21[bit]					
Specification & Features	Structure	Totally enclosed·Non ventilated IP65(Excluding the shaft-through section and connectors)					
	Rated time	Continuous					
	Ambient temp	0~+40[°C]					
	Ambient humidity	20~80[%](Avoid freezing)					
	Atmosphere	Avoid direct sunlight, no corrosive gas, inflammable gas, oil mist, or dust					
	E/V	Elevation/Vibration 49[m/s^2](5G)					
Weight	[kg]	5.6	7.2	8.7	10.2	12.4	17.7

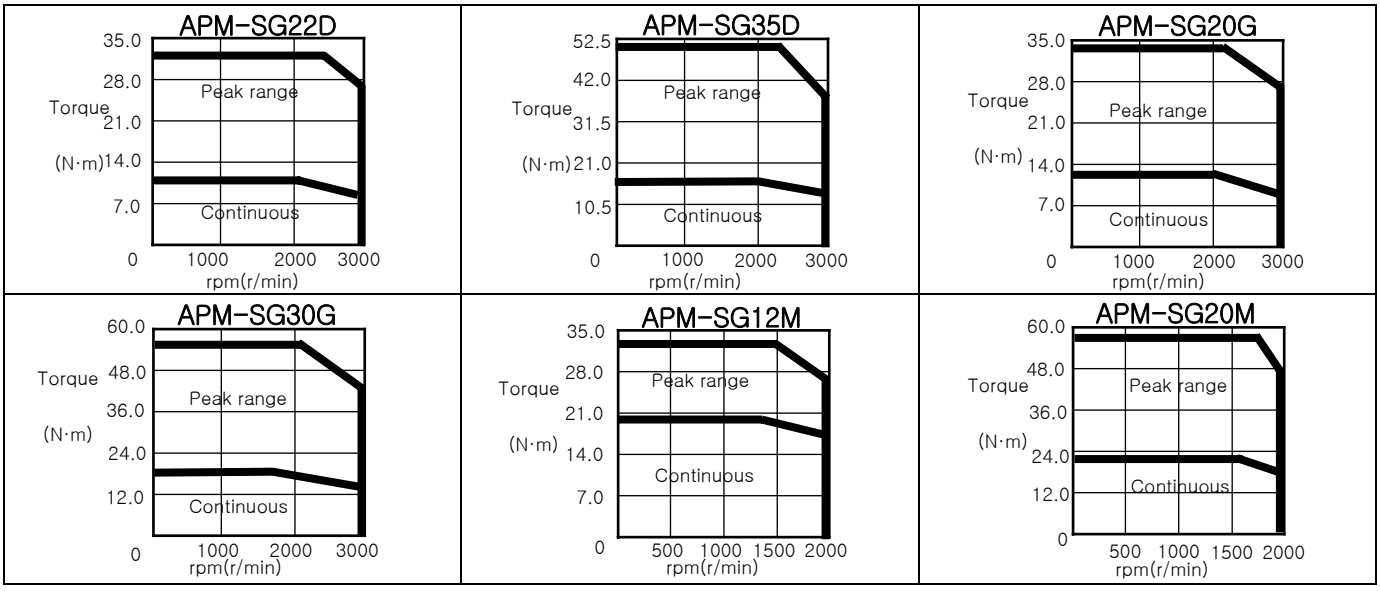
♦ Speed-Torque characteris ♦



■ Product Features

Servo Motor Model (APM-□□□□□)		SG22D	SG35D	SG20G	SG30G	SG12M	SG20M
Applicable drive (APD-□□□□)		VN20	VN35	VN20	VN30	VN15	VN20
Rated Output	[kW]	2.2	3.5	1.8	2.9	1.2	2.0
Rated Torque	[N·m]	10.5	16.7	11.5	18.5	11.5	19.1
	[kgf·cm]	107.2	170.5	116.9	188.4	116.9	194.9
Maximum Instantaneous Torque	[N·m]	31.5	50.1	34.4	55.4	34.4	57.3
	[kgf·cm]	321.5	511.5	350.8	565.1	350.8	584.6
Rated rpm	[r/min]	2,000		1,500		1000	
Maximum rpm	[r/min]	3000		3,000		2000	
Inertia	[kg·m^{2}x10^{-4}]	51.42	80.35	51.42	80.35	51.42	80.35
	[gf·cm·s^2]	52.47	81.99	52.47	81.99	52.47	81.99
Allowable load inertia ratio		5 times of motor inertia					
Rated power rate	[kW/s]	21.45	34.75	25.53	42.41	25.53	45.39
Speed/Position Detector	Standard	Incremental 5[V] Line Drive 3,000[P/R]					
	Option	Serial Inc. 17 ~ 21[bit]					
Specification & Features	Structure	Totally enclosed·Non ventilated IP65(Excluding the shaft-through section and connectors)					
	Rated time	Continuous					
	Ambient temp	0~+40[°C]					
	Ambient humidity	20~80[%](Avoid freezing)					
	Atmosphere	Avoid direct sunlight, no corrosive gas, inflammable gas, oil mist, or dust					
	E/V	Elevation/Vibration 49[m/s^2](5G)					
Weight	[kg]	17.44	23.12	17.44	23.12	17.44	23.12

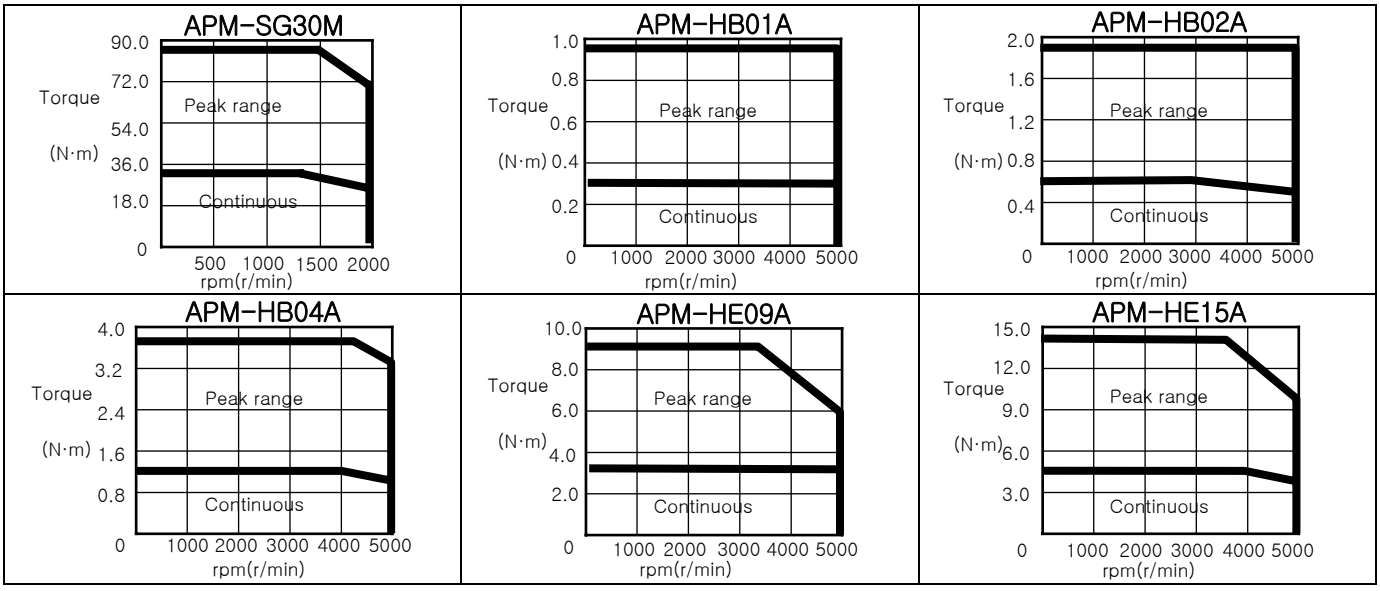
♦ Speed-Torque characteris ♦



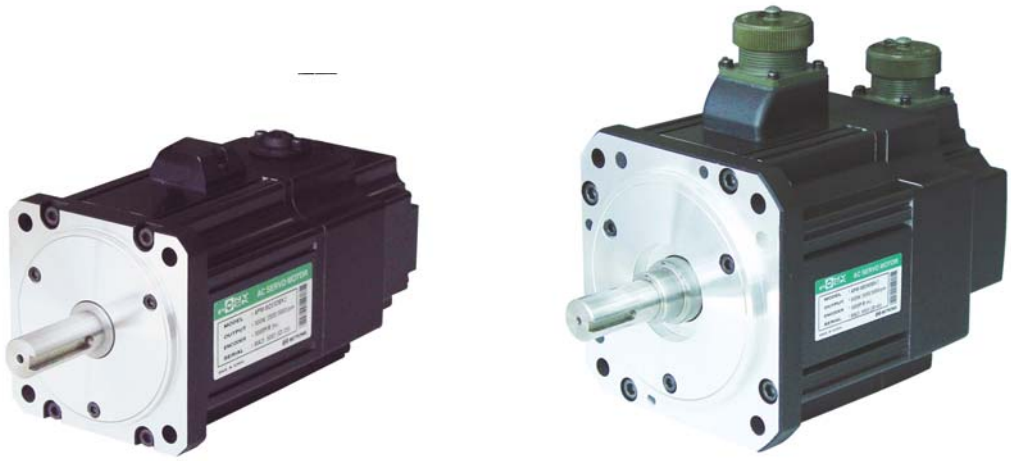
■ Product Features

Servo Motor Model (APM-□□□□□)		SG30M	HB01A	HB02A	HB04A	HE09A	HE15A
Applicable drive (APD-□□□□)		VN30	VN01	VN02	VN04	VN10	VN15
Rated Output	[kW]	3.0	0.1	0.2	0.4	0.9	1.5
Rated Torque	[N·m]	28.6	0.318	0.637	1.274	2.86	4.77
	[kgf·cm]	292.3	3.25	6.50	13.0	29.2	48.7
Maximum Instantaneous Torque	[N·m]	85.9	0.955	1.912	3.822	8.59	14.32
	[kgf·cm]	876.9	9.74	19.5	39.0	87.7	146.1
Rated rpm	[r/min]	1000	3000				
Maximum rpm	[r/min]	2000	5000				
Inertia	[kg·m^{2}x10^{-4}]	132.41	0.269	0.333	0.461	19.558	22.268
	[gf·cm·s^2]	135.11	0.274	0.339	0.470	19.943	22.707
Allowable load inertia ratio		5배	20 times of motor inertia			10 times of motor inertia	
Rated power rate	[kW/s]	61.97	3.34	11.98	34.47	4.10	10.01
Speed/Position Detector	Standard	Incremental 5V Line Driver 1,024P/R				2,048 P/R	
	Option	Serial Inc. 17 ~ 21[bit]					
Specification & Features	Structure	Totally enclosed·Non ventilated IP65(Excluding the shaft-through section and connectors)					
	Rated time	Continuous					
	Ambient temp	0~+40[°C]					
	Ambient humidity	20~80[%](Avoid freezing)					
	Atmosphere	Avoid direct sunlight, no corrosive gas, inflammable gas, oil mist, or dust					
	E/V	Elevation/Vibration 49[m/s^2](5G)					
Weight	[kg]	31.82	0.89	1.16	1.69	5.82	7.43

♦ Speed-Torque characteris ♦



■ Electronic Brake's Specification



Brake Type Servo Motor

Applicable Motor Series	APM-SA	APM-SB	APM-SC	APM-SE	APM-SF	APM-SG
Use	Maintenance	Maintenance	Maintenance	Maintenance	Maintenance	Maintenance
Power Supply [V]	DC 24V	DC 24V	DC 24V	DC 24V	DC 24V	DC 90V
Rated Friction Torque [N•m]	0.32	1.47	3.23	9.2	40.2	74
Capacity [W]	6	6.5	9	7	33	25
Coil Resistance [Ω]	96	89	64	1150	245	327
Rated Current [A]	0.25	0.27	0.38	0.08	0.37	0.28
Braking type	Spring brake	Spring brake	Spring brake	Spring brake	Spring brake	Spring brake
Insulation Class	F - class	F - class	F - class	F - class	F - class	F - class

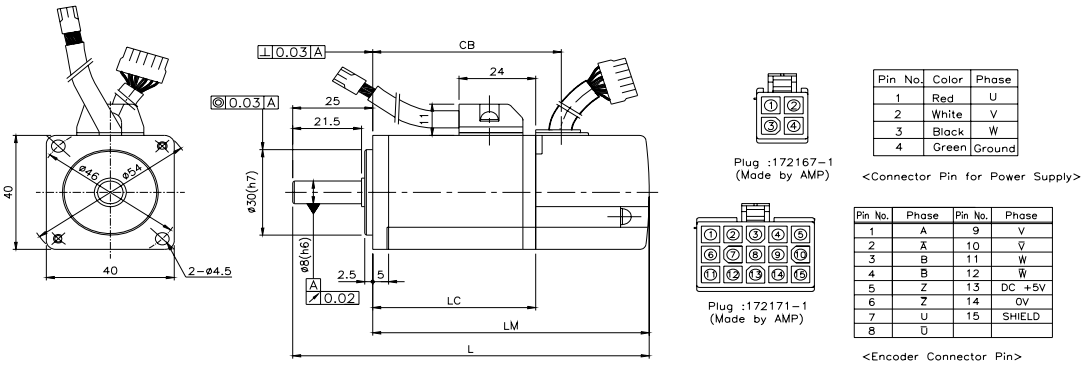
Note) 1. For the Electronic Brake that is attached to our Servo Motor, the same specifications are to be applied as per the series.

2. Never use it for braking purpose because the electronic brake is only for maintenance of stopped condition.

3. The characteristic of electronic brake is measured at 20°C.

6.1.2 External Dimensions6

♦ Standard type : APM-SAR3A, APM-SAR5A, APM-SA01A



Pin No.	Color	Phase
1	Red	U
2	White	V
3	Black	W
4	Green	Ground

<Connector Pin for Power Supply>

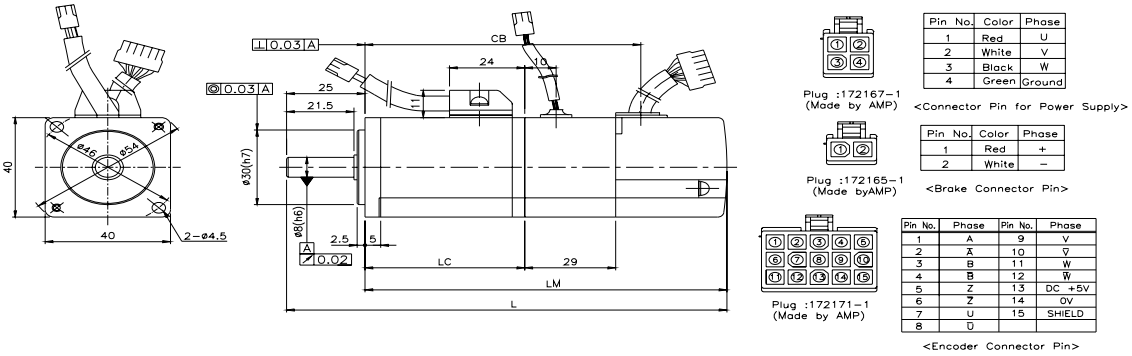
Pin No.	Phase	Pin No.	Phase
1	A	9	V
2	$\bar{A}$	10	$\bar{V}$
3	B	11	W
4	$\bar{B}$	12	$\bar{W}$
5	Z	13	DC +5V
6	$\bar{Z}$	14	0V
7	U	15	SHIELD
8	$\bar{U}$		

<Encoder Connector Pin>

Model	External dimensions				Weight(kg)
	L	LM	LC	CB	
SAR3A	104.5	79.5	44	52	0.3
SAR5A	111.5	86.5	51	59	0.4
SA01A	128.5	103.5	68	76	0.52

Note1) 40Flange's standard axis is straight.

♦ Brake-attached type : APM-SAR3A, APM-SAR5A, APM-SA01A



Pin No.	Color	Phase
1	Red	U
2	White	V
3	Black	W
4	Green	Ground

<Connector Pin for Power Supply>

Pin No.	Color	Phase
1	Red	+
2	White	−

<Brake Connector Pin>

Pin No.	Phase	Pin No.	Phase
1	A	9	V
2	$\bar{A}$	10	$\bar{V}$
3	B	11	W
4	$\bar{B}$	12	$\bar{W}$
5	Z	13	DC +5V
6	$\bar{Z}$	14	0V
7	U	15	SHIELD
8	$\bar{U}$		

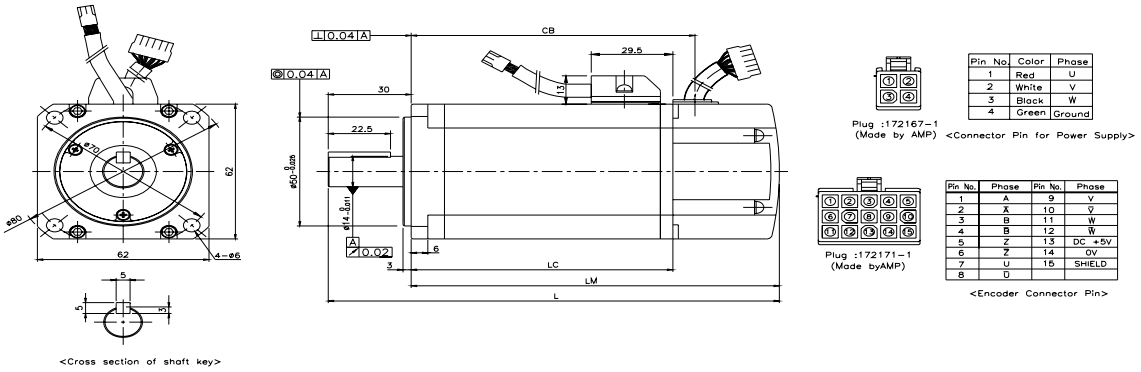
<Encoder Connector Pin>

Model	External dimensions				Weight(kg)
	L	LM	LC	CB	
SAR3A	133.5	108.5	44	81	0.65
SAR5A	140.5	115.5	51	88	0.75
SA01A	157.5	132.5	68	105	0.87

Note1) 40Flange's standard axis is straight.

Note2) Use DC 24[V] for brake input power supply

♦ Standard type : APM-SB01A, APM-SB02A, APM-SB04A

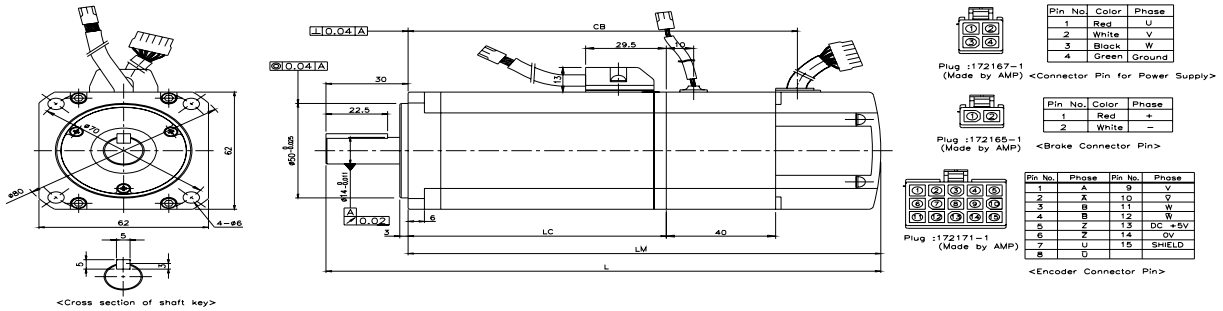


Pin No.	Color	Phase
1	Red	U
2	White	V
3	Black	W
4	Green	Ground

Pin No.	Phase	Pin No.	Phase
1	A	9	V
2	Ā	10	V̄
3	B	11	W
4	B̄	12	W̄
5	Z	13	DC +5V
6	Z̄	14	0V
7	U	15	SHIELD
8	Ū		

Model	External dimensions				Weight(kg)
	L	LM	LC	CB	
SB01A	120.5	90.5	52.5	60.5	0.84
SB02A	134.5	104.5	66.5	74.5	1.11
SB04A	162.5	132.5	94.5	102.5	1.64

♦ Brake-attached type : APM-SB01A, APM-SB02A, APM-SB04A



Pin No.	Color	Phase
1	Red	U
2	White	V
3	Black	W
4	Green	Ground

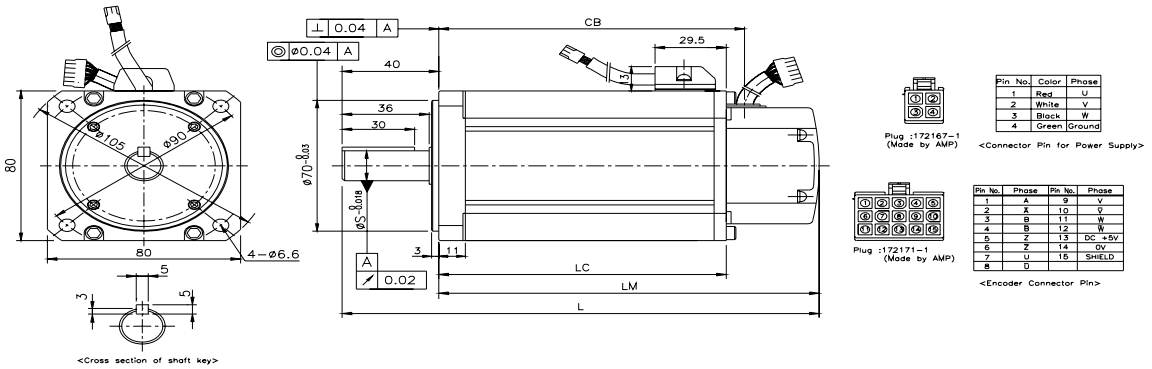
Pin No.	Color	Phase
1	Red	+
2	White	–

Pin No.	Phase	Pin No.	Phase
1	A	9	V
2	Ā	10	V̄
3	B	11	W
4	B̄	12	W̄
5	Z	13	DC +5V
6	Z̄	14	0V
7	U	15	SHIELD
8	Ū		

Model	External dimensions				Weight(kg)
	L	LM	LC	CB	
SB01A	160.5	130.5	52.5	100.5	1.21
SB02A	174.5	144.5	66.5	114.5	1.49
SB04A	202.5	172.5	94.5	142.5	2.05

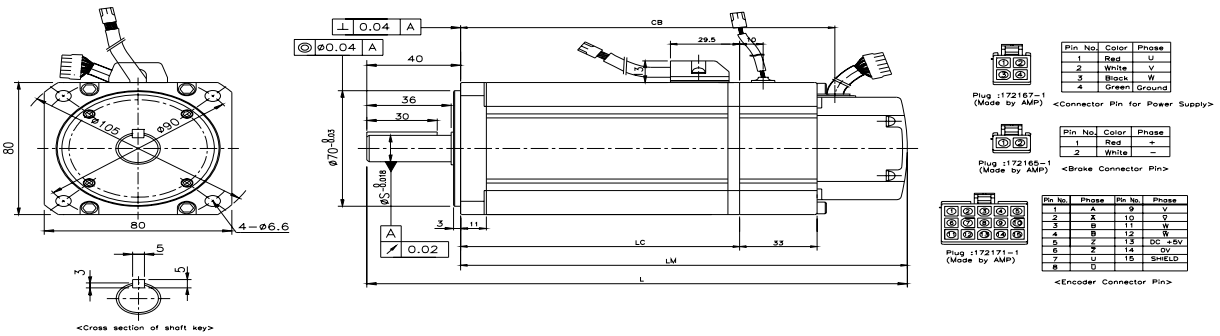
Note) Use DC 24[V] for brake input power supply.

♦ Standard type : APM-SC04A,SC03D, APM-SC06A,SC05D, SC08A,SC06D, SC10A,SC07D



Model	External dimensions					Weight(kg)
	L	LM	LC	CB	S	
SC04A,SC03D	158	118	79	86.5	14	1.85
SC06A,SC05D	178	138	99	106.5	16	2.49
SC08A,SC06D	198	158	119	126.5	16	3.15
SC10A,SC07D	218	178	139	146.5	16	3.80

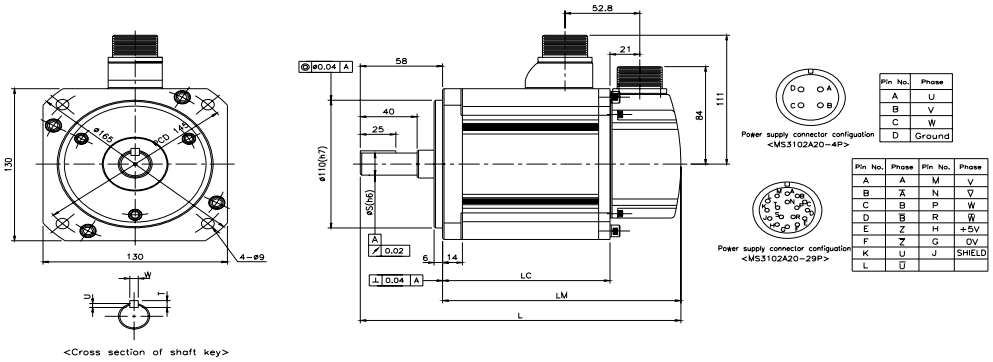
♦ Brake-attached type : APM-SC04A,SC03D,SC06A,SC05D,SC08A,SC06D,SC10A,SC07D



Model	External dimensions					Weight(kg)
	L	LM	LC	CB	S	
SC04A,SC03D	191	151	79	119.5	14	2.45
SC06A,SC05D	211	171	99	139.5	16	3.09
SC08A,SC06D	231	191	119	159.5	16	3.75
SC10A,SC07D	251	211	139	179.5	16	4.40

Note) Use DC 24[V] for brake input power supply.

♦ Standard type : APM-SE09A,SE06D,SE05G,SE03M, APM-SE15A,SE11D,SE09G,SE06M
APM-SE22A,SE16D,SE13G,SE09M, APM-SE30A,SE22D,SE17G,SE12M

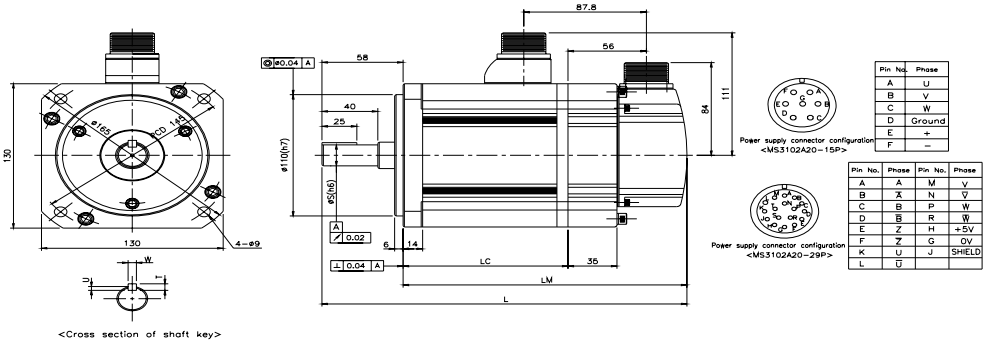


Pin No.	Phase
A	U
B	V
C	W
D	Ground

Pin No.	Phase	Pin No.	Phase
A	A	M	V
B	$\overline{A}$	N	$\overline{V}$
C	B	P	W
D	$\overline{B}$	R	$\overline{W}$
E	Z	H	+5V
F	$\overline{Z}$	G	0V
K	U	J	SHIELD
L	$\overline{U}$		

Model	External dimensions				Key dimensions			Weight(kg)
	L	LM	LC	S	T	W	U	
SE09A,SE06D,SE05G,SE03M	202	144	94	19	5	5	3	5.6
SE15A,SE11D,SE09G,SE06M	226	168	118	19	5	5	3	7.2
SE22A,SE16D,SE13G,SE09M	250	192	142	22	6	6	3.5	8.7
SE30A,SE22D,SE17G,SE12M	274	216	166	22	6	6	3.5	10.2

♦ Brake-attached type : APM-SE09A,SE06D,SE05G,SE03M, APM-SE15A,SE11D,SE09G,SE06M
APM-SE22A,SE16D,SE13G,SE09M, APM-SE30A,SE22D,SE17G,SE12M



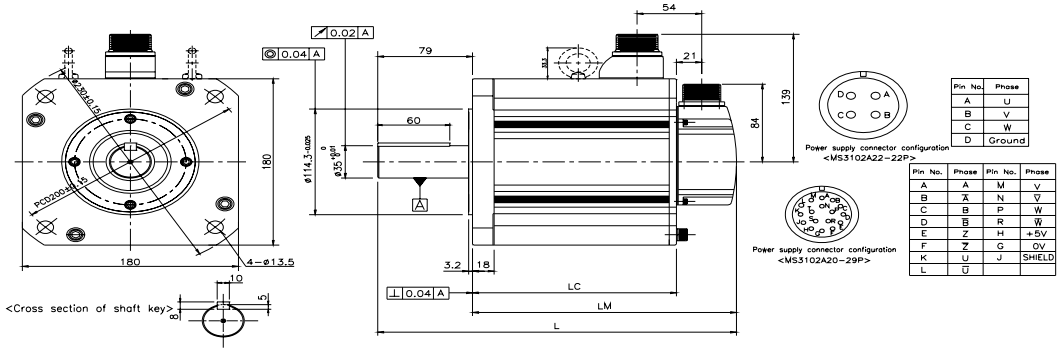
Pin No.	Phase
A	U
B	V
C	W
D	Ground
E	+
F	−

Pin No.	Phase	Pin No.	Phase
A	A	M	V
B	$\overline{A}$	N	$\overline{V}$
C	B	P	W
D	$\overline{B}$	R	$\overline{W}$
E	Z	H	+5V
F	$\overline{Z}$	G	0V
K	U	J	SHIELD
L	$\overline{U}$		

Model	External dimensions				Key dimensions			Weight(kg)
	L	LM	LC	S	T	W	U	
SE09A,SE06D,SE05G,SE03M	237	179	94	19	5	5	3	7.4
SE15A,SE11D,SE09G,SE06M	261	203	118	19	5	5	3	9.0
SE22A,SE16D,SE13G,SE09M	285	227	142	22	6	6	3.5	10.5
SE30A,SE22D,SE17G,SE12M	309	251	166	22	6	6	3.5	12.0

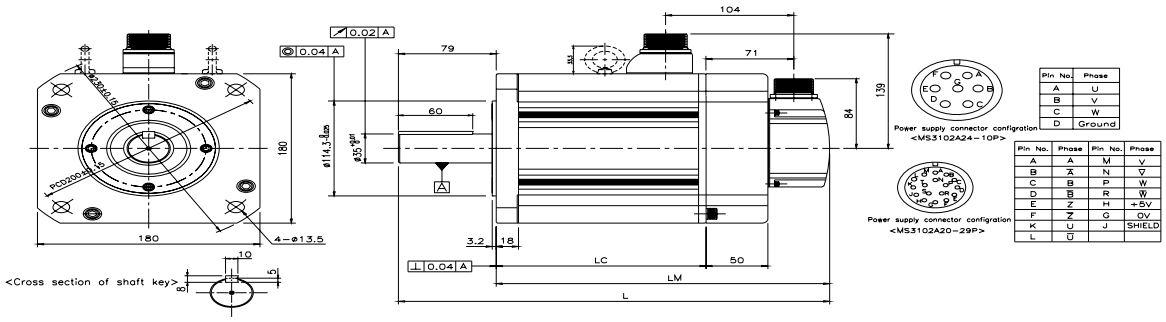
Note) Use DC 24 [V] for brake input power supply.

♦ Standard type : APM-SF30A,SF22D,SF20G,SF12M, APM-SF50A,SF35D,SF30G,SF20M
APM-SF55D,SF44G,SF30M, APM-SF75D,SF60G,SF44M



Model	External dimensions			Weight(kg)
	L	LM	LC	
SF30A,SF22D,SF20G,SF12M	261.8	182.8	132.8	12.4
SF50A,SF35D,SF30G,SF20M	294.8	215.8	165.8	17.7
SF55D,SF44G,SF30M	344.8	265.8	215.8	26.3
SF75D,SF60G,SF44M	404.8	325.8	275.8	35.6

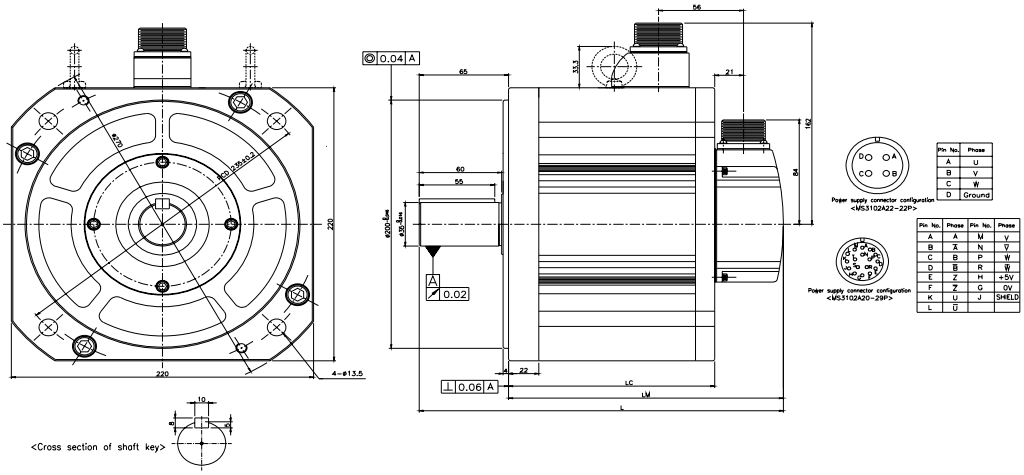
♦ Brake-attached type : APM-SF30A,SF22D,SF20G,SF12M, APM-SF50A,SF35D,SF30G,SF20M
APM-SF55D,SF44G,SF30M, APM-SF75D,SF60G,SF44M



Model	External dimensions			Weight(kg)
	L	LM	LC	
SF30A,SF22D,SF20G,SF12M	311.8	232.8	132.8	17.6
SF50A,SF35D,SF30G,SF20M	344.8	265.8	165.8	24.9
SF55D,SF44G,SF30M	394.8	315.8	215.8	33.5
SF75D,SF60G,SF44M	454.8	375.8	275.8	42.8

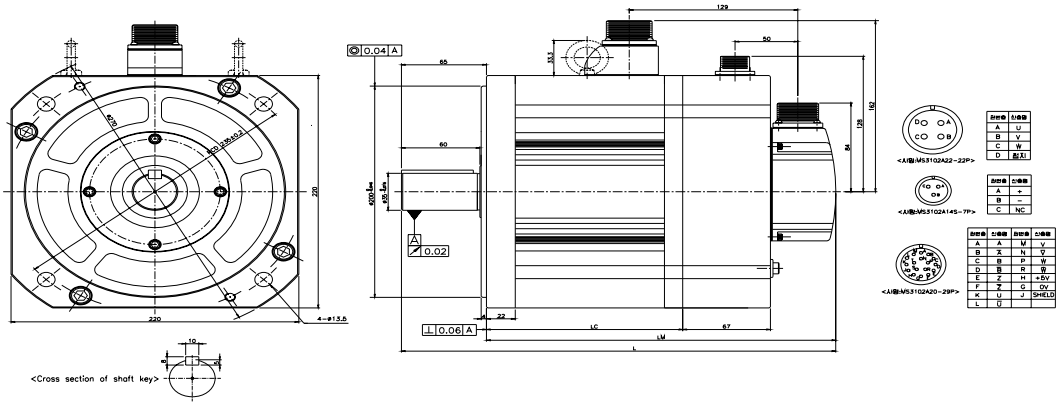
Note) Use DC 24[V] for brake input power supply, Eyebolt is used at over SF55D, SF44G, SF30M type

♦ Standard type :APM-SG22D,SG20G,SG12M, APM-SG35D,SG30G,SG20M
APM-SG55D,SG44G,SG30M, APM-SG75D,SG60G,SG44M



Model	External dimensions			Weight(kg)
	L	LM	LC	
SG22D,SG20G,SG12M	237	172	122	14.2
SG35D,SG30G,SG20M	257	192	142	19.88
SG55D,SG44G,SG30M	293	228	178	28.56
SG75D,SG60G,SG44M	321	256	206	37.28

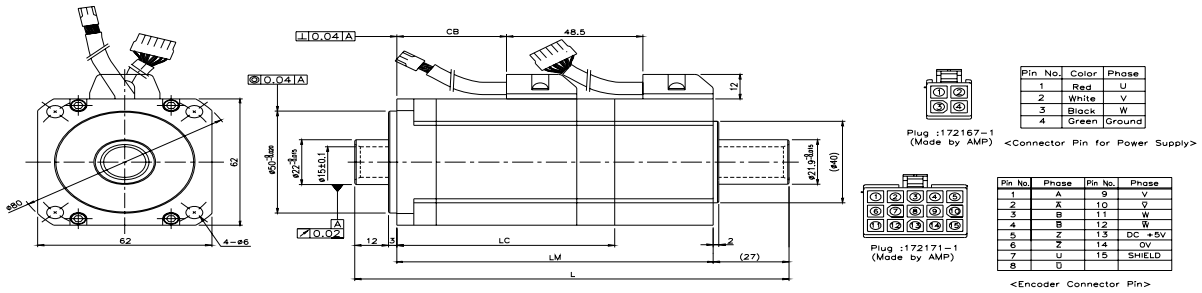
♦ Brake-attached type : APM-SG22D,SG20G,SG12M, APM-SG35D,SG30G,SG20M
APM-SG55D,SG44G,SG30M, APM-SG75D,SG60G,SG44M



Model	External dimensions			Weight(kg)
	L	LM	LC	
SG22D,SG20G,SG12M	304	239	122	22.2
SG35D,SG30G,SG20M	324	259	142	27.88
SG55D,SG44G,SG30M	360	295	178	36.56
SG75D,SG60G,SG44M	388	323	206	45.28

Note) Use DC 90[V] for brake input power supply.

♦ APM-HB01A(Hollow shaft type), APM-HB02A(Hollow shaft type), APM-HB04A(Hollow shaft type)

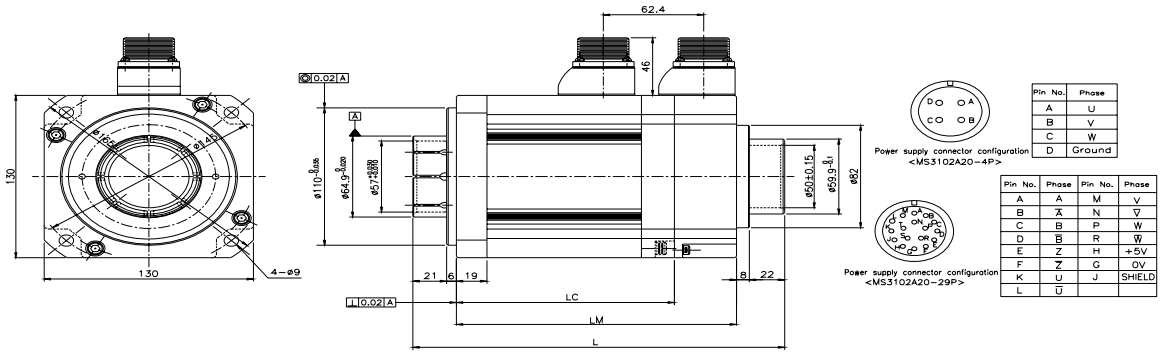


Pin No.	Color	Phase
1	Red	U
2	White	V
3	Black	W
4	Green	Ground

Pin No.	Phase	Pin No.	Phase
1	A	9	V
2	Ā	10	V̄
3	B	11	W
4	B̄	12	W̄
5	Z	13	DC +5V
6	Z̄	14	0V
7	U	15	SHIELD
8	Ū		

Model	External dimensions					Weight(Kg)
	L	LM	LC	CB	Hollow shaft type	
HB01A	140.5	98.5	63.5	25	15	0.89
HB02A	154.5	112.5	77.5	39	15	1.16
HB04A	182.5	140.5	105.5	67	15	1.69

♦ APM-HE09A(Hollow shaft type), APM-HE15A(Hollow shaft type)



Pin No.	Phase
A	U
B	V
C	W
D	Ground

Pin No.	Phase	Pin No.	Phase
A	A	M	V
B	Ā	N	V̄
C	B	P	W
D	B̄	R	W̄
E	Z	H	+5V
F	Z̄	G	0V
K	U	J	SHIELD
L	Ū		

Model	External dimensions				Weight(Kg)
	L	LM	LC	Hollow shaft type	
HE09A	207	150	111.5	50	5.82
HE15A	231	174	135.5	50	7.43

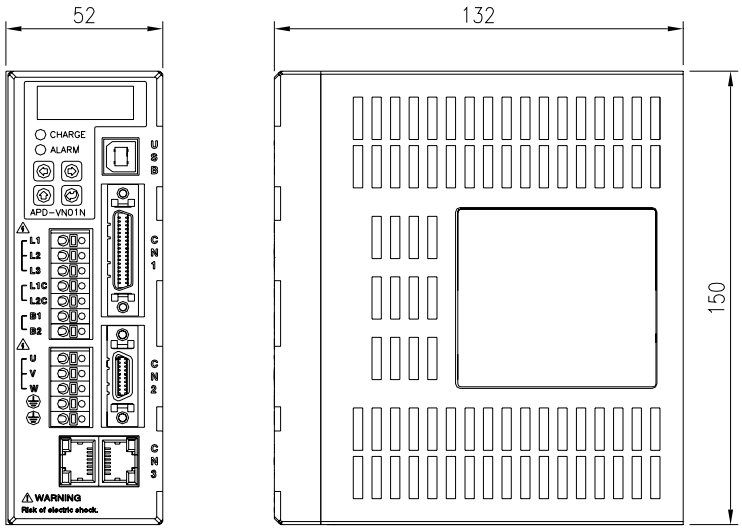
6.2 Servo Drive

6.2.1 Features

Item \ Model		VN01	VN02	VN04	VN07	VN10	VN15	VN20	VN35
Input voltage		3상 AC 200~230[V]+10[%]-15[%], 50/60[Hz]							
Applicable Motor	Voltage type	3 Phase sine wave PWM-driven AC Servo motor							
	Rated current	1.4	1.65	3.0	4.3	6.4	11	16	21
	Max.current	4.2	4.95	9.0	12.9	19.2	33	48	63
Detector system		Standard : Incremental line driver 2000~10000 [P/R] Serial Inc. 17 ~ 21[bit]							
Speed Control mode	Speed control range	Max 1 : 5,000							
	Frequency response	Max 400[Hz], Serial : 600Hz							
	Speed command	DC -10[V] ~ +10[V](Reverse rotation in case of minus voltage), digital command 3 speeds							
	Accleleration/ Deceleration time	Linear or S shape acceleration/deceleration (0~100,000[ms], Setting 1[ms] unit is possible							
	Speed variation ratio	±0.01[%]or less [at Load variation 0~100%] , ±0.1[%]or less[Temp.25±10℃]							
Position Control Mode	Input frequency	Line Drive : 500[kpps] Open Collector : 400[kpps]							
	Input pulse type	A+B phase, forward and reverse pulse, direction + pulse[Line driver, Open collector]							
	Electrical gear ratio	Setting and selecting 4 digital electronic gear ratio. Precise adjustment is possible.							
Torque Control Mode	Torque command input	DC -10[V] ~ +10[V][-Reverse rotation in case of minus voltage]							
	Torque Linearity	2[%] or less							
	Limit speed command	DC 0[V] ~ +10[V], digital command 3 speeds.							
Built In Function	Generated braking	Standard built in [Operating at servo alarm of servo OFF]							
	Regenerated braking	Option		Standard - Attached		Provide standard resistor			
	Display	Built in 7-Segments[6Digits], CHARGE & ALARM Lamp							
	Monitor output	DC -5[V] ~ +5[V], 2 channels [speed, torque, position, etc]							
	Protective functions	Overcurrent, overload, over current limit over, heated power module, overvoltage, voltage shortage, overspeed, wrong wiring, encoder problem, position following problem, UV current sensor problem, motor output problem.							
Ambient Environment	Temp.	0 ~ 50[℃]							
	Humidity	90[%] or less (avoid condensation)							
	Atmosphere	Indoors, no corrosive gas, inflammable gas and fluid, oil mist, or dust							

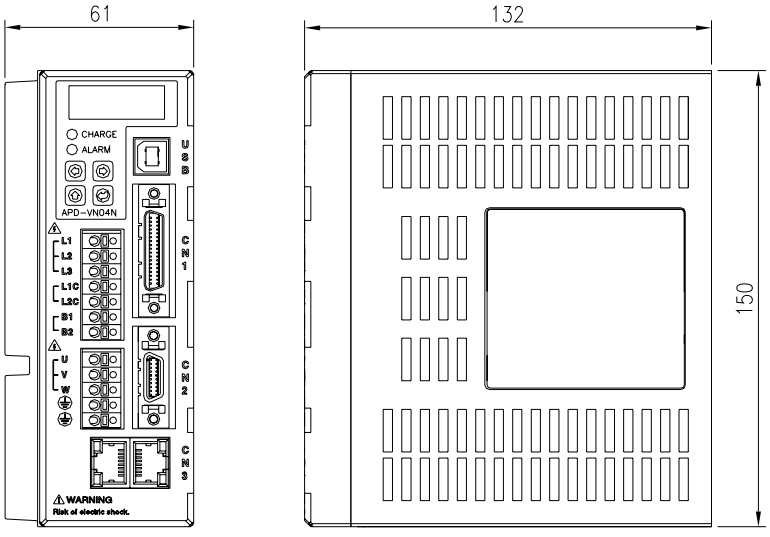
6.2.2 External Dimensions

♦ APD-VN01~02N



★ Weight:0.8[kg]

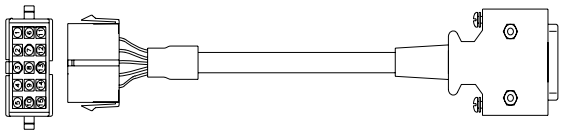
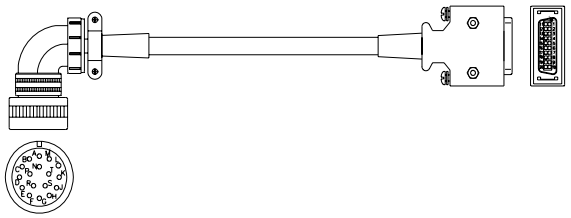
♦ APD-VN04N



★ Weight:1.0[kg]

6.3 Option and Peripherals

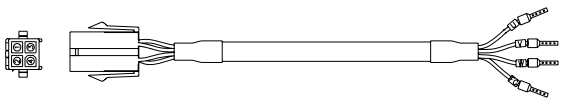
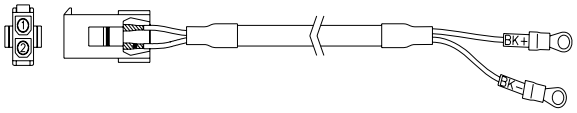
■ Options(Cable)

Classification	Product name	Model(Note1)	Applicable motor	Specification
For Signal	Encoder Cable	APC-E□□□AS	All Models of APM-SA APM-SB APM-SC APM-HB Series	Motor side connector Drive side connector(CN2)  1. Motor side connector 2. CAP (15 Position) : 172163-1(Made by AMP) 1) SOCKET : 170361-1(Made by AMP) 3. Drive side connector(CN2) 1) CASE : 10320-52A0-008(Made by 3M) 2) CONNECTOR : 10120-3000VE(Made by 3M) 4. Cable : 7Px0.2SQ(AWG24)
For Signal	Encoder Cable	APC-E□□□BS	All Models of APM-SE APM-SF APM-SG APM-HE SERIES	Motor side connector Drive side connector(CN2)  1. Motor side connector(MS:Military Standard) 1) PLUG : MS3108B(MS3106B) 20-29S 2. Drive side connector(CN2) 1) CASE : 10320-52A0-008(Made by 3M) 2) CONNECTOR : 10120-3000VE(Made by 3M) 3. Cable : 7Px0.2SQ(AWG24)

Note 1) □□□ of Model No. indicates the kind and length of cable, and the declaration is as below.

Cable Length(m)	3	5	10	20
Robotic Cable	F03	F05	F10	F20
General Cable	N03	N05	N10	N20

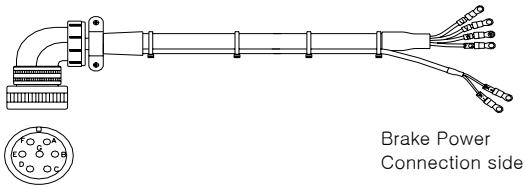
■ Options(Cable)

Classification	Product name	Model(Note1)	Applicable motor	Specification
For Power supply	Standard Power Cable	APC-P□□□CS	All models of APM-SA APM-SB APM-HB Series APM-SC04A APM-SC06A APM-SC03D APM-SC05D APM-SC06D APM-SC07D	Motor side connector Drive side connection  1. Motor side connector 1) CAP (4 Position) : 172159-1(Made by AMP) 2) SOCKET : 170362-1(Made by AMP) 2. Drive side connector(U,V,W,FG) 1) PIN : UA-F1512(Made by Suh-il Electronic) 2) Compressor : UA-510A(Made by Suh-il) 3. Cable : 4Cx0.75SQ(AWG18) (For APM-SAR3A,SAR5A,SA01A, 0.5SQ is used.)
For Power supply	Brake type Power Cable	APC-P□□□KB	All models of APM-SA APM-SB APM-SC SERIES	Motor side connector Drive side connection  1. Motor side connector 1) CAP (6 Position) : 172157-1(Made by AMP) 2) SOCKET : 170362-1(Made by AMP) 2. For power supply of Brake 1) Connection terminal : 1.25x3(KET GP110012) 2) Cable : 2Cx0.75SQ(AWG18)

Note 1) □□□ of Model No. indicates the kinds and length of cable, and declaration is as below.

Cable Length(m)	3	5	10	20
Robotic Cable	F03	F05	F10	F20
General Cable	N03	N05	N10	N20

■ Options(Cable)

Classification	Product name	Model(Note1)	Applicable motor	Specification
For Power supply	Brake type Power Cable	APC-P□□□MB	All Models of APM-SE SERIES	Motor side connector / Drive side connection  Brake Power Connection side 1. Motor side connector(MS : Military Standard) 1) PLUG : MS3108B(MS3106B)20-15S 2. Drive side connection(U,V,W,FG) 1) Connection terminal : 2.5x4(KET GP110721) 2) Cable : 4Cx2.0SQ(AWG14) 3. Brake power connection side(+,-) 1) Connection terminal : 1.25x3(KET GP110012) 2) Cable : 2Cx0.75SQ(AWG18) Note) Apply UA-F1512 Pin for the drive connection side of APM-SE03M Series cable.

Note 1) □□□ of Model No. indicates the kinds and length of cable, and declaration is as below.

Cable Length(m)	3	5	10	20
Robotic Cable	F03	F05	F10	F20
General Cable	N03	N05	N10	N20

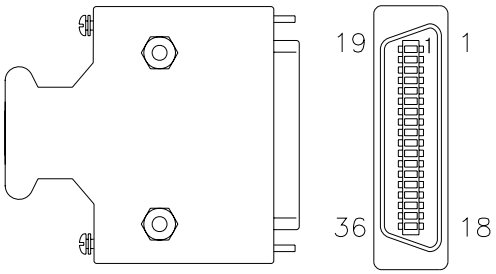
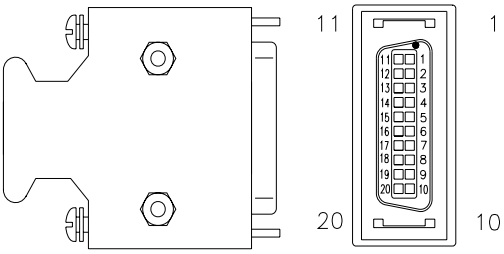
■ Options(Connector)

Classification	Product name	Model(Note1)	Applicable drive	Specification
For Signal	CN1 Cable	APC-CN1□□VNA	All Models of APD-VN SERIES	[Upper Controller] [Drive connection side CN1] Indicates Pin No. 1. Drive side connection(CN1) 1) CASE : 10336-52A0-008(Made by 3M) 2) CONNECTOR : 10136-3000VE(Made by 3M) 3) CABLE : ROW-SB0.1Cx36C(AWG 28)

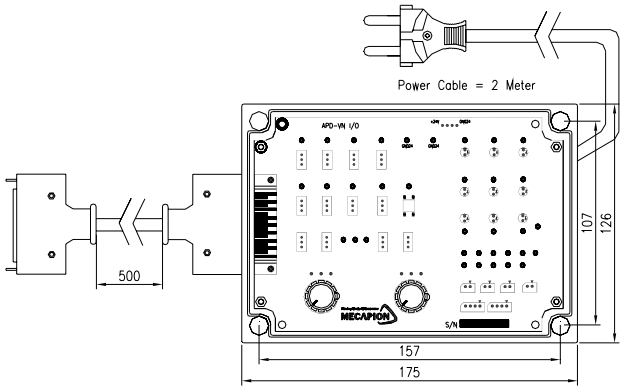
Note) □□ Model No. indicates the Cable length, and declaration is as below.

Cable Length(m)	1	2	3	5
Declaration	01	02	03	05

■ Options(Connector)

Classification	Product name	Model(Note1)	Applicable drive	Specification
CN	CN1 Connector	APC-CN1NNA	All Models of APD-VN SERIES	 1) CASE : 10336-52A0-008(Made by 3M) 2) CONNECTOR : 10136-3000VE(Made by 3M)
CN	CN2 Connector	APC-CN2NNA	All Models of APD-VN SERIES	 1) CASE : 10320-52A0-008(Made by 3M) 2) CONNECTOR : 10120-3000VE(Made by 3M)

■ Options(I/O JIG)

Classification	Product name	Model(Note1)	Specification
I/O JIG	Standard type I/O JIG	APC-VSIONA	 1. Input Power supply : Single Phase AC220[V] 2. I/O function of standard type(APD-VN) Servo Drive 3. Cable length can be adjusted.

Note1) □□ of Model No. indicates the cable length, and declaration is as below.

Cable Length(m)	1	2	3	5
Declaration	01	02	03	05

Chapter7

Maintenance and Inspection

7.1 Maintenance and Inspection

7.1.1 Caution 7-2

7.1.2 Inspection Items 7-3

7.1.3 Period of Replacing Parts 7-4

7.2 Fault Diagnosis and Corrective Actions

7.2.1 Servo Motor 7-5

7.2.2 Servo Drive 7-6

7.1 Maintenance and Inspection

In the chapter, maintenance and inspection of servo motor and drive are explained.

7.1.1 Caution

① When checking motor voltage: As the voltage applied to the motor from the servo amplifier is PWM controlled, wave form of pulse phase is displayed. There may be significant difference in indicator value depending on types of meters, so be sure to check with rectification voltmeter for more detail inspection.

② When checking motor current: The pulse wave form is smoothed to sine wave to a certain degree by the motor reactance. Connect and use a moving-iron type ampere meter.

③ When checking power: Use an electrodynamics type 3-phase watt-meter

④ Other devices: When using oscilloscope or digital volt meter, please make sure that they should not be contacted to the ground. For input current, please use 1[mA] or less of current.

7.1.2 Inspection Items

> CAUTION
>
> Charged voltage may remain in the smoothing condenser creating an element of danger when inspecting drive. Turn off power and wait for approximately 10 minutes before starting inspection.

①Inspection of servo motor

Inspection items	Inspection period	Method	Remark
Vibration And noise	Every month	With the sense of touch and the sense of hearing.	It should not be big (serious) compared to the normal condition.
External appearance	According to Contamination And damage	Clean it up with fabric or air	-
Insulation Resistor	Once a year At least	Disconnect with drive, and measure resistor with 500V mugger tester. Normal is more than 10[㏁].<Note1>	If resistance is less than 10[㏁], inquire to service department
Change Oil seal	Once in 5,000 Hours at least	Detach from machine, and replace it.	Only for the motor which contains oil seal
Overall inspection	Once in 20,000 Hours or 5 years At least	Inquire to our service department	Customer is required not to disassemble the Servo motor and clean it by themselves.

(Note 1) Measure Between one of U, V, W and FG

② Followings are for maintaining Servo drive.

The Servo drive need not to be checked and maintained on a daily basis as it uses highly reliable parts, But check it at least once in a year.

Inspection item	Period	Check for	Solution
Main body and circuit board	Once a year at least	Dust, Oil	Clean up with air or cloths.
Terminal screws for looseness	Once a year at least	Screws for connection terminal and connector are securely tightened	Tighten it
Parts for defects on main body and circuit board	Once a year at least	Discoloration caused by heat, damage or disconnection	Inquire to our service department

7.1.3 Period of Replacing Parts

The following parts undergo aging process as time passes due to mechanical friction or the characteristics of the material used, leading to the deterioration of equipment performance or breakdown. Check the parts Periodically and replace them, of necessary.

① Smoothing

The characteristics become aged due to the effects of ripple current

The operating life of the condenser varies significantly depending on ambient temperature and operating conditions. When used continuously in normal environment, its standard life span is 10 years. The condenser becomes aged fast during a specific period. Inspect it at least once a year

(It is desirable to conduct inspection semi-annually in case the life span is nearing the exhaustion point.)

.

※ For judgment criteria, visually Check:

a. Case status: Check if the sides and bottom of the case are expanded.

b. Cover plate: Check if significant expansion, severe cracks or damage.

c. Explosion-proof value: Check for significant expansion or wear

d. Check periodically the external condition for cracks, tear, discoloration and water leakage, If the rated capacity of the condenser drops to 85[%] or less, it indicates life span has exhausted.

① Relays

Inadequate contact may occur due to contact wear resulting from switching current. The really wear condition is affected by the power capacity. The standard life span is 100,000 accumulated switching (switching life) operations.

② Motor Bearing

Replace bearing when it is used for 20,000~30,000 hours under rated speed and rated load. The motor bearing condition is dependent upon the operating conditions. Replace the bearing if abnormal noise or vibration is discovered.

[Standard replacement period]

Parts	Standard replacement period	How to replace
Smoothing condenser	7~8 years	Replace with new parts (decide after check)
Relays	-	Decide after check
Fuses	10 years	Replace with new ones
Aluminum electrolytic Condenser on PCB	5 years	Replace with new PCB(Decide after check)
Cooling fan	4~5 years	Replace with new ones
Motor oil seal	-	Decide after check
Motor oil seal	5,000 hours	Replace with new ones

7.2 Fault Diagnosis and Corrective Actions

In case an error occurs during operation, alarm display AL-□□ or Err□□ is displayed on the display window of loader. At this time, take the following steps. If taking such steps does not correct errors, contact our service center.

7.2.1 Servo motor

[Actions to taken in case of errors]

Symptom	Cause	Inspection	Corrective action
Motor Does not start	CCWLIM, CWLIM input is OFF	Refer to chapter 1.2.System Configuration	Turn "ON" the CCWLIM, CWLIM input
	Menu miss-set	Check menu of motor, encoder and encoder type control mode	Reset menu (refer to chapter 4)
	Motor defective	Check motor lead terminal with a tester(Resistance between each phase ; less than 10[Ω]	If voltage is correct, replace motor
	Screws loosened	Check the screws	Retighten loose screws
	External miswriting or cable disconnected	Check the motor and encoder wiring	Rewire, Replace cable
	Encoder defective	Check the output wave form	Replace encoder (Use A/S service)
Motor Running Unstable	Defective connection	Check connection of the motor lead terminal	Repair defective part
	Input voltage low	Check drive input voltage	Change power supply
	Overloaded	Check machine condition	Remove foreign material from the rotator and lubricate (or grease) it
Motor Over-Heated	Ambient temperature high	Check the motor ambient temperature (should be lover than 40℃)	Change heat-shield structure
	Motor surface stained	Check motor surface for attached Foreign materials	Clean the surface of the motor
	Overloaded	Check the load rate of the drive. Check acceleration/deceleration cycle.	Reduce load Increase Acceleration/deceleration time
	Magnetic power deteriorated	Check counter electromotive voltage	Replace motor
Abnormal noise	Defective coupling	Check the tightness of the coupling screws and the concentricity of joints.	Readjust coupling
	Defective bearing	Check the bearing for vibration or abnormal noise.	Contact our service center
	Parameter miss-set	Check control parameters	Refer to Chapter 4

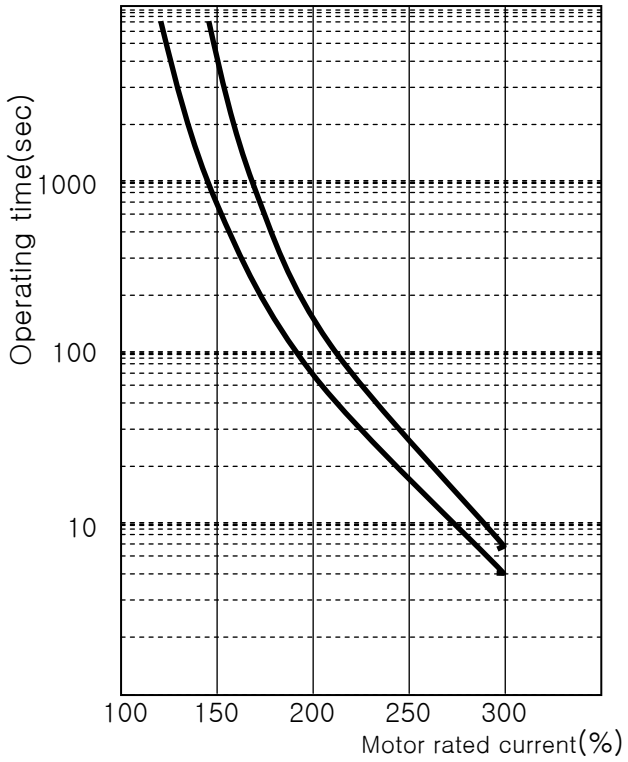
7.2.2 Servo Drive

If the ALARM occurs, error signal out contact (ALARM) is turned OFF, and the motor stops by the action of Dynamic Brake

[Actions to be taken in case of an alarm]

CODE	Name	Cause	Corrective action
nor-oF	Normal sv-off	Normal operating condition	-
nor-on	Normal sv-on	Normal operating condition	-
AL-01	Not used	-	-
AL-02	Low Voltage	Low Voltage, Main power shut off	Check Input voltage level, Check the wiring of main power supply
AL-03	Line Fail	Motor and Encoder U,V,W wiring Error	Check set values and CN2 wiring, U,V,W wiring. Replace Motor
AL-04	Motor Output	Error of Output (U.V.W) open phase	Motor wiring, Power Module Error
AL-05	Encoder Pulse	No. of encoder pulse set error	[PE-204]set value, CN2wiring, Replace Motor
AL-06	Following Error	Position pulse following error	Check the [PE-502] position command pulse set value, wiring and Limit contact [PE-502],[PE-718]ser value, Gain set value.
AL-07	Over Heat	Over hitting	Load status check, Heat fan installation.
AL-08	Over Current	Over current	Check the output terminal wiring motor, encoder set value, gain set, Replace drive if O.C. Continues.
AL-09	Over Load	Over load	Check Load condition, Brake operating condition, wiring, motor, and encoder set value.
AL-10	Over Voltage	Over voltage	Check input voltage, wiring of braking resistance, damage of braking resistance, excessive regenerative operation
AL-11	Over Speed	Over speed	Encoder Error, Check encoder set value, Encoder wiring, gain set, Replace Motor
AL-12	Not Used	Not used	-
AL-13	Position Pulse error	Position pulse Error	Replace drive
AL-14	ABS Data Error	Absolute encoder data transmission error	Check the initial reset
AL-15	ABS Battery Error	Absolute encoder battery error	Check the initial reset, battery is discharged
AL-16	ABS Multi Error	Absolute encoder multi-rotation data transmission error	Check the initial reset
AL-17	ABS Read Fail	Absolute encoder reading error	Absolute encoder check, CN2 wiring check
AL-18	U-Hall Offset Error	U phase current sensor Error	Replace drive
AL-19	V-Hall Offset Error	V phase current sensor Error	Replace drive
AL-20	Memory Error	Parameter memory Error	Replace drive
AL-21	Not Used	Not used	
AL-22	Data Init Error	Data Initialization Error	Replace drive
AL-23	EPWR	Hardware error, 9 wires type Encoder Power Error	Replace drive
AL-24	USB Error	USB Communication Error	Check wiring, Replace drive
AL-25	RS422 Error	RS422 Communication Error	Check wiring, Replace drive
AL-26	Over Regeneration	Over regenerative Error of Setting time of [PE-419]	Check input voltage, wiring of braking resistance, Replace drive
AL-27	Current Limit Over	Over current limited (Continuance operation above 1sec)	Motor wiring, Check Load condition
AL-28	Not Used	Not used	
AL-29	Not Used	Not used	
AL-30	In/Out Logic error	In/Out Logic Error	Set value adjustment
AL-31	Encoder N/D Error	Encoder N/D Error	Set value adjustment
AL-32	Egear N/D Error	Egear N/D Error	Set value adjustment
Err1	Error1	Input of parameters, which cannot be changed, is attempted during Servo ON	Turn OFF the servo and change the set value
Err2	Error2	Input of data which is out of set range	Input values within the set range
Err3	Error3	Change the menu which is locked by [PC-810](Menu Data Lock)	Change the menu [PC-810] with unlock condition

[Overload charateristic curves of Servo Drive]



Rated current (%)	Overload operating time		
	Min.	Max.	Set vlalue
100	∞		
120	∞		
150	500	1200	800
200	50	120	80
250	12	28	20
300	3	7	5

[Appendix]

Appendix 1. Menu summary ····· 8-2

Appendix 2. Motor type/ ID ····· 8-14

Appendix 3. Trial run procedures····· 8-16

Appendix 1. Menu summary

The menu is composed of 9 groups and refer to the details on each menu

Menu No.	Menu group	Descriptions
Pd-001 ~ Pd-020	Status Menu	Display the status of operation
PA-101 ~ PA-120	Alarm Menu	Save and display the alarm history
PE-201 ~ PE-220	System Menu	Save the data on system composition
PE-301 ~ PE-320	Control Menu	Save the fixed parameters of control
PE-401 ~ PE-420	Analog Menu	Save the fixed parameters input/output
PE-501 ~ PE-520	InOut Menu	Save the input/output variables
PE-601 ~ PE-620	Speed Operation Menu	Save the fixed speed operation
PE-701 ~ PE-720	Pulse Operation Menu	Save the fixed position pulse operation
PC-801 ~ PC-820	Command Menu	Manipulating operation

Refer to the meanin of abbreviation for the operation mode.

P : Used in posiiton control mode

S : Used in speed control mode

T : Used in torque mode

1). Display menu for the status of operation

MENU			Unit	Initial	Description	Mode
Comm. code	(CODE)	NAME	Min.	Max.		
0	Pd-001		-	-	Display the status of current operation -Servo off :nor-oF, Servo on :nor-on, Alarm:AL-XX	PST
		Current State	-	-		
1	Pd-002		[r/min]	0	Display the current operation speed	PST
		Current Speed	-10000	10000		
2	Pd-003		[r/min]	0	Display the current operation speed	ST
		Command Speed	-10000	10000		
3	Pd-004		[pulse]	0	Display the accumulated value of position command pulse -In case of exceeding /Max., it will be displayed as Min/ Max.	P
		Current Pulse	-99999	99999		
4	Pd-005		[pulse]	0	Display the accumulated value of following position command pulse - In case of exceeding Min/Max, it will be displayed as Min/ Max.	PST
		Feedback Pulse	-99999	99999		
5	Pd-006		[pulse]	0	Display the remaining position pulse operated by servo - In case of exceeding Min/Max, it will be displayed as Min/ Max.	P
		Pulse Error	0	99999		
6	Pd-007		-	1000	Display the numerator 0 of electric gear ratio	P
		E-Gear N0	1	60000		
7	Pd-008		[%]	0	Display the current command torque under torque operation - PS: Accumulated current command torque, T :Current command torque	T
		Command Torque	-300.00	300.00		
8	Pd-009		[%]	300	Display torque limitation	PST
		Torque Limit	-300	300		
9	Pd-010		[%]	0.00	Display the current load rate comparing with the rating	PST
		Current Load	0.00	300.00		
10	Pd-011		[%]	0.00	Display the average load rate for 5 seconds comparing with the rating	PST
		Average Load	0.00	300.00		
11	Pd-012		[%]	0.00	Display the max. instantaneous load rate comparing with the rating	PST
		Maximum Load	-300.00	300.00		
12	Pd-013		[V]	0.0	Display the DC Link of current main power	PST
		DC Link Voltage	0.0	500.0		
13	Pd-014		-	-	Display the status of connection of CN1 input contact point Connection : Turning on the light, No connection : Turning off the light	PST
		I/O SET	-	-		
14	Pd-015		0	0	Display the status of operating time of regenerative braking Display the value fixed at [PE-419]	PST
		Reg. Brake Time	[ms]	3000		
15	Pd-016		-	-	Display the status of I/O contact point logic recognized from CN1 I/O	PST
		I/O State	-	-		
16	Pd-017		-	01100	Display the status of logic for input contact point 0~4 4=pclear/stop/tclear,3=cwl,2=ccwl,1=almrst,0=svon	PST
		Input Logic Set	00000	11111		
17	Pd-018		-	0000	Display the status of logic for input contact point 5~8 8=egear2/spd2,7=egear1/spd1,6=mode/trqlim,5=dir	
		Input Logic Save	0000	1111		
18	Pd-019		-	001	Display the logic of output contact point 2=inspd/inpos, 1=Ready/Brk, 0=Alarm	
		Output Logic Set	000	111		
19	Pd-020		-	-	Display the secret No. of software version	PST
		Software Version	-	-		

* You can check the Display Menu under alarm status when you press [Enter] after pressing [Left] or [Right]

2) Dispalying the status of alarm

(MENU)			Unit	Initial	Description	Mode
Comm .code	(CODE)	(NAME)	Min.	Max.		
Alarm history 01 ~ 20			-	-	Display the alarm history	PST
20 ~ 39	PA-101 ~ PA-120	Alarm History01 ~ Alarm History20	-	-		

Alarm code and check

CODE	Name	Description or main cause	Check point
nor-oF	Normal svoff	Normal status of Servo off	-
nor-on	Normal svon	Normal status of Servo on	-
AL-01	Not used	-	-
AL-02	Low Voltage	Low voltage, main power is turned off	Input level, wiring of power
AL-03	Line Fail	Wrong wiring of motor /U,V,W, of encoder	Fixed value, CN2 wiring, U,V,W wiring, replacing motor
AL-04	Motor Output	Malfunction of driving circuit of motor	Motor wiring, power module error
AL-05	Encoder Pulse	Wrong setting the no. of encoder pulse	Fixed value of [PE-204], CN2 wiring, replacing motor
AL-06	Following Error	Wrong following position pulse	Excessive position command pulse , wiring and limit contact point, [PE-502], fixed value of [PE-718], gain setting value
AL-07	Over Heat	Over heat	status of load, installing heatproof pan
AL-08	Over Current	Over current	Replacing wiring, motor, phase resistance, encoder setting value and wiring, replacing drive
AL-09	Over Load	Over load	The status of load, Brake, wiring, motor, encoder setting value
AL-10	Over Voltage	Over voltage	Input voltage, regenerative resistor, damage, wiring, excessive regenerative operation
AL-11	Over Speed	Over speed	Encoder error, encoder setting value, encoder wiring, gain setting, replacing motor
AL-12	Not Used	Not used	-
AL-13	Position Pulse error	Position pulse error	Replacing drive
AL-14	ABS Data Error	Transmitting error of absolute encoder	Initial reset
AL-15	ABS Battery Error	Battery error of absolute encoder	Initial reset, discharge of battery
AL-16	ABS Multi Error	Error with transmitting Multi-rotation data of absolute encoder	Initial reset
AL-17	ABS Read Fail	Reading error of absolute encoder	Absolute encoder, CN2 wiring
AL-18	U-Hall Offset Error	Current sensor error of U phase	Replacing drive
AL-19	V-Hall Offset Error	Current sensor error of V phase	Replacing drive
AL-20	Memory Error	Memory error of parameter	Replacing drive
AL-21	Not Used	Not used	
AL-22	Data Init Error	Initialization error of Data	Replacing drive
AL-23	EPWR	Hardware error, power error of 9 lines encoder	Replacing drive
AL-24	USB Error	USB comm. Error	Wiring inspection, replacing drive
AL-25	RS422 Error	RS422 comm. Error	Wiring inspection, replacing drive
AL-26	Over Regeneration	Excessive regeneration (Error of Setting time of [PE-419])	Input voltage, regenerative braking wiring, replacing drive
AL-27	Current Limit Over	Excessive current limit	Motor wiring, the status of load
AL-28	Not Used	Not used	
AL-29	Not Used	Not used	
AL-30	In/Out Logic error	Logic error of I/O	Revising the fixed data
AL-31	Encoder N/D Error	Prescaler ratio error of Encoder output	Revising the fixed data
AL-32	Egear N/D Error	Prescaler ratio error of electric gear	Revising the fixed data
Err1	Error1	When you try to change the menu which can't be allowed revised under Servo-on	Revise menu after Servo-off
Err2	Error2	In case that the data which exceeds the limitation is input	Input the data which is within the range
Err3	Error3	When you try to change the menu under [PC-810](Menu Data Lock)	Change the data under Unlock at [PC-810]

3) System variables setting menu

"**" indicates the menu which can't be changed or reset during Servo-On), "*" inidicates the menu which can't bechanged during Servo-On

(MENU)			Unit	Initial	Description	Mode
Comm .code	(CODE)	(NAME)	Min.	Max.		
40	*PE-201		–	–	Setting motor ID Motor ID is set automatically from PE-210 to PE218	PST
		Motor ID	0	99		
41	*PE-202		[bps]	0	Setting the speed of RS422 comm. of CN3 0 : 9600, 1 : 19200, 2 : 38400, 3 : 57600	PST
		Baud Rate	0	3		
42	**PE-203		–	0	Setting the encoder type 0 : 15 lines A lead, 1 : 15 lines, B lead, 2 : 9 lines, A lead, 3 : 9 lines B lead, 4 : 7 lines INC. 17 / 21bit	PST
		Encoder Type	0	4		
43	**PE-204		[p/r]	2500	Setting the no. of pulse per rpm of encoder	PST
		Encoder Pulse	1	6000		
44	PE-205		[%]	300	Setting torque limitation at CW rotation	PST
		CCW TRQ Limit	1	350		
45	PE-206		[%]	300	Setting torque limitation at CCW rotation	PST
		CW TRQ Limit	1	350		
46	*PE-207		–	0	Setting the drive ID at communication	PST
		System ID	0	99		
47	*PE-208		–	0	Setting the group ID of the drive at communication	PST
		System Group ID	0	99		
48	PE-209		–	2	Setting the start menu of drive	PST
		Start Menu No.	1	20		
49	*PE-210		[gf·cm·s^2]	ID	Setting the moment of inertia of motor	PST
		Inertia	0.01	300.00		
50	*PE-211		[kgf·cm/A]	ID	Setting the torque constant of motor	PST
		Trq Con	0.01	300.00		
51	*PE-212		[mH]	ID	Setting the phase inductance of motor.	PST
		Phase Ls	0.001	30.000		
52	*PE-213		[ohm]	ID	Setting the phase resistance of motor.	PST
		Phase Rs	0.001	30.000		
53	*PE-214		[A]	ID	Setting the rated current of motor	PST
		Rated Is	0.01	999.99		
54	*PE-215		[r/min]	ID	Setting the max. speed of motor	PST
		Max Speed	0.0	300.00		
55	*PE-216		[r/min]	ID	Setting the current speed of motor	PST
		Rated Speed	0.0	10000		
56	*PE-217		[pole]	ID	Setting the no. of poles of motor	PST
		Pole Number	2	98		
57	*PE-218		–	0	Setting the gain group of motor	
		Motor Gain Group	0	9		
58	PE-219		[mA]	0	Setting the current offset of U phase	
		U Current Offset	-200	200		
59	PE-220		[mA]	0	Setting the current offset of V phase	
		V Current Offset	-200	200		

4) Control variables setting menu

**" indicates the menu which can't be changed or reset during Servo-On), "*" inidicates the menu which can't bechanged during Servo-On

(MENU)			Unit	Initial	Description	Mode
Comm .code	(CODE)	(NAME)	Min.	Max.		
60	PE-301		[배]	2.0	Setting the ratio of inertia of load	PST
		Inertia Ratio	1.0	500.0		
61	PE-302		[1/s]	50	Setting proportional gain 1 at position control - [PE-520] : 1, it is applied when pulse error is less than [PE-306]	P
		Position P Gain1	1	500		
62	PE-303		[1/s]	70	Setting proportional gain 2 at position control - [PE-520] : 1, it is applied when pulse error is less than [PE-306]	P
		Position P Gain2	1	500		
63	PE-304		[%]	0	Setting the control ratio of position feedfoward	P
		P Feedforward	0	100		
64	PE-305		[ms]	0	Setting the control filter constant of position feedfoward	P
		P FF FLT TC	0	100.00		
65	PE-306		[10pulse]	0	Setting the conversion range of position gain 1,2 - [E-520]:1, gain 1 is converted into gain 2 when the pulse error is more than [PE-306]	P
		Position Zero Gain	0	5000		
66	PE-307		[rad/s]	500	Setting speed proportional gain 1 - [E-520]:1, it is applied when the current speed is less than [PE-313]	PS
		Speed P Gain1	0	5000		
67	PE-308		[rad/s]	800	Setting speed proportional gain 2 - [E-520]:1, it is applied when the current speed is more than [PE-313]	PS
		Speed P Gain2	0	5000		
68	PE-309		[ms]	20	Setting the constant 1 of speed integral - [E-520]:1, it is applied when the current speed is less than [PE-313]	PS
		Speed I TC1	1	10000		
69	PE-310		[ms]	13	Setting the constant 2 of speed integral - [E-520]:1, it is applied when the current speed is more than [PE-313]	PS
		Speed I TC2	1	1000		
70	PE-311		[ms]	0.50	Setting speed command filter	S
		Speed IN FT	0.0	100.00		
71	*PE-312		[ms]	0.50	Setting speed feed-back filter	PS
		Speed F/B FT	0.0	100.0		
72	PE-313		[r/min]	0	.Setting the speed range of zero sped gain - The speed which converts speed control gain1→2 - In case of 0. [PE-519] is not available	PS
		Zero Speed Gain	0	500		
73	PE-314		[ms]	0.50	Setting torque command filter	PST
		TORQ. CMD FLT	0.0	100.00		
74	PE-315		-	0	Setting the motions Width to avoid resonance	PST
		DE-Resonance	0	1		
75	PE-316		[Hz]	300	Setting the operation frequency to avoid resonance	PST
		Notch Frequency	0	1000		
76	PE-317		[Hz]	100	Setting the Band Width to avoid resonance	PST
		Notch Bandwidth	0	1000		
77	PE-318		-	0	0: Not used 1: Used	PST
		Overload offset	0	1		
78	PE-319		[10pulse]	20	Setting the ranged pulse of position proportional gain 2 - [E-520]:1, it is converted into gain 2 when pulse error is more than [PE-319]	S
		Position Gain2 Range	1	5000		
79	PE-320		-	1	Setting the function to improve the torque of zero speed 0 : Not used 1 : operated	S
		Zero Speed Lock	0	1		

5) Analog I/O variables setting menu

"**" indicates the menu which can't be changed or reset during Servo-On), "*" inidicates the menu which can't bechanged during Servo-On

(MENU)			Unit	Initial	Description	Mode
Comm .code	(CODE)	(NAME)	Min.	Max.		
80	*PE-401	Analog Speed	[r/min] 1	2000 6000	Setting the analog speed command at 10[V]	ST
81	PE-402	AnalogSpeed Offset	[mV] -1000	0 1000	Setting the offset of analog speed command	S
82	PE-403	Zero Speed Clamp	- 0	0 1	Setting the clamp function of analog zero speed 0 : Not used, 1 : operated	S
83	PE-404	SClamp Volt	[mV] 1	1 1000	Setting the range of analog zero speed clamp	S
84	*PE-405	Speed Override	- 0	0 1	Setting speed override operation function 0 : Not used, 1 : operated	S
85	*PE-406	Analog Torque	[%] 1	100 300	Setting torque command at 10[V]	PST
86	PE-407	Torque Offset	[mV] -1000	0 1000	Setting the offset of analog torque command	T
87	PE-408	TClamp Mode	- 0	0 1	Setting the clamp function of analog zero torque command 0 : Not used, 1 : operated	T
88	PE-409	TClamp Volt	[mV] 1	1 1000	Setting the clamp voltage of analog zero torque command	T
89	PE-410	Monitor Type1	- 0	1 5	Setting the type of analog 1 for monitor 0:command speed, 1:current speed, 2:command torque , 3:current torque , 4: command pulse frequency , 5:error pulse	PST
90	PE-411	Monitor Mode1	- 0	0 1	Setting the mode of analog output 1 of monitor 0 : -5~+5V 1 : 0~+5V(absolute value)	PST
91	PE-412	Monitor Scale1	- 0.1	1.0 50.0	Setting magnification of analog output for monitor Speed :Max. speed, torque:300%, command pulse:500k, error pulse :excessive position error	PST
92	PE-413	Monitor Offset1	[mV] -1000	0 1000	Setting offset of analog output 1 for monitor	PST
93	PE-414	Monitor Type2	- 0	3 5	Setting the type of analog output 2 for monitor 0:command speed , 1:current speed, 2:command torque , 3:current torque , 4:command pulse frequency, 5:error pulse	PST
94	PE-415	Monitor Mode2	- 0	0 1	Setting the mode of analog output for monitor 0 : -5~+5V 1 : 0~+5V(absolute value)	PST
95	PE-416	Monitor Scale2	- 0.1	1.0 50.0	Setting magnification of analog output 2 for monitoring speed:max speed, torque:300%, command pulse:500k, error pulse: excessive position error	PST
96	PE-417	Monitor Offset2	[mV] -1000	0.0 1000	Setting the offset of analog output 2 for monitoring	PST
97	PE-418	Torque Com Dir	- 0	0 1	Selecting direction of motor operation under torque mode 0 : + voltage, CW 1 : -voltage, CCW	T
98	PE-419	Regeneration Brake time	[ms] 100	500 1000	Setting the max. running time of regenerative braking resistor In case of exceeding the time, excessive regeneration[AL-26] occurs	
99	PE-420	Speed, Torque Cmd Offset	- 0	0 3	Applying [PC-813], [PC-814] analog offset function 0 : Not used 1 : PC-813 is available 2 : PC-814 is available 3 : PC-813, PC-814 are available at the same time	ST

6) I/O contact point variables setting menu

"**" indicates the menu which can't be changed or reset during Servo-On), "*" inidicates the menu which can't bechanged during Servo-On

(MENU)			Unit	Initial	Description	Mode
Comm .code	(CODE)	(NAME)	Min.	Max.		
100	PE-501		[10pulse]	10	Setting the output range of position operation completion signal	P
		Inposition	1	60000		
101	PE-502		[10pulse]	90000	Setting the output range of position operation following error signal	P
		Follow Error	1	60000		
102	PE-503		[r/min]	10	Setting the output range of zero speed signal	PST
		Zero Speed RNG	0.0	6000		
103	PE-504		[r/min]	100	Setting the output range of speed attachment completion signal	S
		Inspeed	0.0	500		
104	PE-505		[r/min]	50	Setting the output speed of brake signal	PST
		Brake SPD	0.0	6000		
105	PE-506		[ms]	10	Setting the output delaying time of brake signal	PST
		Brake On Delay Time	0	1000		
106	PE-507		–	1	Setting the main power error, reset mode of error 0: Manual reset , 1: Auto reset	PST
		PowerFail Mode	0	1		
107	PE-508		–	0	Select the output point of Ready/Brake 0 : Ready output , 1 : break output	PST
		Ready / Brake Select	0	1		
108	PE-509		–	1	Setting the clear mode of position pulse 0: Edge(off → on) , 1: Level(on)	P
		Pulse Clear Mode	0	1		
109	**PE-510		–	1	Setting the numerator of prescaler for encoder output pulse	PST
		Pulse Output Numerator	1	16384		
110	**PE-511		–	–	Setting the denominator of prescaler for encoder output pulse	
		Pulse output Denominator	1	16384		
111	**PE-512		–	0	Setting the direction of encoder output pulse A/B phase 0 : A phase Lead, 1 : B phase Lead	PST
		Pulse Output A/B Lead	0	1		
112	PE-513		–	1	Setting the output pulse type of serial encoder' Z phase 0: A phase half cycle, 1 : A phase 1 cycle	PST
		Pulse Output Z	0	1		
113	PE-514		–	0	Setting the switch to change the operating direction 0 : DIR ON→converted into analog direction, STOP→STOP 1 : DIR OFF, STOP ON → CCW / DIR ON, STOP OFF → CW DIR ON, STOP OFF → STOP / DIR OFF, STOP OFF → STOP	S
		Dir Select Mode	0	1		
114	*PE-515		–	001	Setting the logic of output contact point 2=inspd/inpos, 1=Ready/Brk, 0=Alarm	PST
		Output Logic	000	111		
115	PE-516		[ms]	0	Setting the delaying time which is the actual PWM-OFF under Servo-OFF	PST
		PWM off Delay	10	1000		
116	*PE-517		–	01100	Setting the logic status of input contact 0~4 4:pclear/stop/tclear, 3:cwl, 2:ccwl, 1:almrst,0=svon	PST
		Intput 0~4 Logic	00000	11111		
117	*PE-518		–	0000	Setting the logic status of input contact 5~8 8:egear2/spd2, 7:egear1/spd1, 6:trqlim/mode, 5:dir	PST
		Intput 5~8 Logic	0000	1111		
118	PE-519		[%]	50	Setting zero speed gain ratio	S
		ZSPD Gain Rate	1	100		
119	*PE-520		–	0	Setting gain 1, gain 2 mode 0 : gain 1 only 1 : conversion mode of gain 1, 2 a. [PE-601] : 1 the current speed is [PE-313] or more: speed gain 1 → 2 b. [PE-601] : 2 (including a) Error pulse is [PE-306] or below: position gain 1 – : position gain 1→2 Error pulse is [PE-319] or below: position gain 2	PST
		Gain Conv Mode 0	0	1		

7) Speed operation variables setting menu

"**" indicates the menu which can't be changed or reset during Servo-On), "*" inidicates the menu which can't bechanged during Servo-On

(MENU)			Unit	Initial	Description	Mode
Comm .code	(CODE)	(NAME)	Min.	Max.		
120	*PE-601	Operation Mode	– / 0	1 / 5	**Set the operation mode** 0: torque control operation 1: speed control operation 2: position control operation 3: speed/position control , In case of mode=off, position control 4: speed/torque control, In case of mode=off, torque control 5: position/torque control , in case of mode=off, torque control	PST
121	PE-602	Speed Command1	[r/min] / -6000	200 / 6000	Selected by the combination of speed command input contact point SPEED1 / SPEED2 SPD1 SPD2 OFF OFF : analog speed command ON OFF : internal speed command 1 OFF ON : internal speed command 2 ON ON : internal speed command 3	ST
122	PE-603	Speed Command2	[r/min] / -6000	1000 / 6000		ST
123	PE-604	Speed Command3	[r/min] / -6000	3000 / 6000		ST
124	PE-605	Not Used				
125	PE-606	Not Used				
126	PE-607	Z Search Operation Speed	[r/min] / 1	10 / 300	Setting the speed for encoder's Z phase search operation - Fixed value for the operation of PC-806	PST
127	PE-608	Manual P Operation Speed	[r/min] / 1	500 / 6000	Setting the speed for manual position operation - Fixed value for the operation of PC-807	PST
128	PE-609	Accel Time	[ms] / 0	0 / 10000	Setting the accel. time of speed command	S
129	PE-610	Decel Time	[ms] / 0	0 / 10000	Setting the decel. time of speed command	S
130	*PE-611	S Type Control	– / 0	0 / 1	Setting S shaped operation at speed mode 0 : lineal accel./decl., 1 : S shaped accel./decl	S
131	PE-612	Test Run Speed0	[r/min] / -6000	100.0 / +6000	Setting the speed 0 under continuous test run	PST
132	PE-613	Test Run Speed1	[r/min] / -6000	-500.0 / +6000	Setting the speed 1 under continuous test run	PST
133	PE-614	Test Run Speed2	[r/min] / -6000	1000.0 / +6000	Setting the speed 2 under continuous test run	PST
134	PE-615	Test Run Speed3	[r/min] / -6000	-2000.0 / +6000	Setting the speed 3 under continuous test run	PST
135	PE-616	Test Run Time0	[s] / 1	5 / 3600	Setting the speed 0 under continuous test run	PST
136	PE-617	Test Run Time1	[s] / 1	5 / 3600	Setting the speed 1 under continuous test run	PST
137	PE-618	Test Run Time2	[s] / 1	5 / 3600	Setting the speed 2 under continuous test run	PST
138	PE-619	Test Run Time3	[s] / 1	5 / 3600	Setting the speed 3 under continuous test run	PST
139	PE-620	Inspeed Type	– / 0	1 / 1	Setting the output type of INSPD out contact point 0 : zero speed output , 1 : coincided speed	S

8) Setting position operation variables

"**" indicates the menu which can't be changed or reset during Servo-On), "*" inidicates the menu which can't bechanged during Servo-On

(MENU)			Unit	Initial	Description	Mode
Comm. code	(CODE)	(NAME)	Min.	Max.		
140	*PE-701		–	1	Set the logic of position operation input pulse 0: negative logic A/B pulse, 1: negative logic 2-pulse 2: negative logic 1-pulse, 3: positive logic A/B pulse 4: positive logic 2-pulse, 5: positive logic 1-pulse	P
		Pulse Logic	0	5		
141	*PE-702		–	1000	Set the denominator/numerator 0,1,2,3, of electric gear ratio EGEAR1, Applied electric gear ratio 0, 1, 2, 3 based on 2 contact point EGEAR1 / EGEAR2 Electric gear ratio 0 : OFF / OFF Electric gear ratio 1 : ON / OFF Electric gear ratio 2 : OFF / ON Electric gear ratio 3 : ON / ON	P
		Electric Gear N0	1	30000		
142	*PE-703		–	1000		
		Electric Gear D0	1	30000		
143	*PE-704		–	1000		
		Electric Gear N1	1	30000		
144	*PE-705		–	2000		
		Electric Gear D1	1	30000		
145	*PE-706		–	1000		
		Electric Gear N2	1	30000		
146	*PE-707		–	3000		
		Electric Gear D2	1	30000		
147	*PE-708		–	1000		
		Electric Gear N3	1	99999		
148	*PE-709		–	4000		
		Electric Gear D3	1	30000		
149	PE-710					
		Not used				
150	PE-711		–	0	Select the electric gear ratio 0: Electric gear ration 0~3 can be selected 1: Override the offset data to the numerator 0 of electric gear ratio	P
		E-Gear Mode	0	1		
151	PE-712		–	0	Select the offset value of electric gear ratio 0 a. Set the offset data of numerator 0 b. EGEAR1 ON→increased, EGEAR2 ON→decreased	P
		E-Gear offset	-30000	30000		
152	*PE-713		–	0	Set the pulse direction of position	P
		Pulse Dir	0	1		
153	**PE-714		[ms]	0	Set the accel/decel. Time of position command	P
		Pos Pulse Acc/Dec Time	0	100		
154	PE-715		–	–		
		Not Used	–	–		
155	PE-716		–	–		
		Not Used	–	–		
156	PE-717		[Turn]	10.00	Set the target position based on the unit of under manual position operation [PC-807] You can set the direction at [PC-807] : [Left]-CCW, [Right]-CW	PST
		Manual Pos Oper distance	0.00	300.00		
157	PE-718		–	0	Set the function of limit contact point CCWLIM, CWLIM 0 : CCWLIM, CWLIM : Pulse command Clear 1 : CCWLIM, CWLIM : Pulse command counter → If it exceeds [PE-502], AL-06(Following Error) will occur	P
		Pos Limit Pulse Clear	0	1		
158	*PE-719		[2^]	16	Display the Multi Turn Data of ABS Encoder	PST
		ABS Multi Turn	10	16		
159	*PE-720		[2^]	17	Display the Single Turn Data of ABS Encoder	PST
		ABS Single Turn	10	17		

9) Operation menu

"**" indicates the menu which can't be changed or reset during Servo-On), "*" inidicates the menu which can't bechanged during Servo-On

(MENU)			Unit	Initial	Description
Comm. code	(CODE)	(NAME)	Min.	Max.	
160	PC-801		-	-	Reset the alarm with "CLEAr" message
		Alarm Reset	-	-	If you press [Enter], alarm will be reset with "CLEAr"
161	PC-802		-	-	Clear all alarm history
		Alarm His Clear	-	-	If you press [Enter], the alarm history will be cleared (PA-101~PA-120) with "CLEAr"
162	PC-803		[r/min]	-	Manual test operation will perform 1. [Enter] : Display test run speed (PE-602) 2. [Up] : PE-602~PE-604 will be displayed by turns The speed will be displayed as absolute value 3. [Right] : CW rotation 4. [Left] : CCW rotation 5. [Enter] : test run is terminated ->return to menu ※ If you press [Enter] under alarm status, 'Err1' will be displayed
		Manual Test Run	-Min	Max	
163	PC-804		[r/min]	-	Continuous test run will be performed 1. [Enter] : step 0~3 will be performed Step Speed Time 0 PE-612 PE-616 1 PE-613 PE-617 2 PE-614 PE-618 3 PE-615 PE-619 2. [Enter] : test run is terminated ->return to menu ※ If you press [Enter] under alarm status, 'Err1' will be displayed
		Auto Test Run	-Min	-Max	
164	PC-805		-	2.0	Automatic tuning operation is performed 1. [Enter] : Display the moment of inertia 2. [Up] : Auto gain tuning operation at 100 rpm 3. [Up] : If you keep pressing [Up], it increases by 200rpm as 100->300->500rpm 4. [Right] : continuous operation time is increased 5. [Left] : continuous operation time is decreased 6. If the tuning value is not changed, the work is completed 7. [Enter] : PE-301,307,309 are saved and return to menu ※ If you press [Enter] under alarm status, 'Err1' will be displayed
		Gain Tune Run	1	50	
165	PC-806		[Turn]	0.00	Z phase search operation at the speed set at [PE-607] 1. [Enter] : Mode execution/clear 2. [Left] or [Right]: operation after setting the direction of Z phase search operation 3. [Enter] : Z phase Z phase search operation is terminated ->return to menu Displayed data : The no. of rpm ※ If you press [Enter] under alarm status, 'Err1' will be displayed. ※ In case of turning ON CCWLIM, CWLIM, operation is not available
		Z POS Search	0	9.99	
166	PC-807		[Turn]	-	Operated at the speed set at PE-608 for the target

		Manual Position Run	–	–	position set at PE-717 1. [Enter] : Mode execution / clear 2. [Left] or [Right]: Setting the direction of the target position 3. [Up]: Start / Stop 4. [Enter]: Position operation is terminated =>Return to menu ※ Displayed data : The no. of rotation ※ If you press [Enter] under alarm, 'Err1' will be displayed ※ CCW, CW limit contact point is turn OFF, it will not be applied at start time. During operation CCW. CW is not applied
167	PC-808	Output Test	– –	– –	Set the forced ON/OFF for output contact points temporarily [Right] : out0→out1→out2 Move to the direction of increase [Left] : out2→out1→out0 Move to the direction of decrease [Up] : outx-L ↔ outx-H has been changed [Enter] : Return to menu - The related bit is L(OFF), H(ON) based on Normal A contact point out2: INPOS, out1: READY/BRAKE, out0: ALARM
168	*PC-809	Menu data Init	– –	– –	Initialize the menu as the status shipped from the factory 1. [Enter] : If you press [Enter], CLEAr will be displayed 2. When you press [Left]or [Right], it will return to menu without initialization 3. When you press [Up], the initialization will be performed and return to the menu automatically ※ [PE-201] ~ [PE-220] will not be changed ※ Turn OFF/ON the power
169	PC-810	Menu data Lock	– –	– –	Menu locking function is activated 1. [Enter] : Lock/unLock will be changed by turns ※ Lock display: Lock, Unlock display : unlock
170	PC-811	ABS Encoder set	– –	– –	Reset the absolute encoder 1. [Enter] : "reset" will be displayed for 5 seconds and rest the absolute encoder
171	PC-812	Current Offset Save	[mA] –	– –	Compensate the current offset of Hall-CT 1. [Right]: Display the offset of U phase 2. [Left] : Display the offset of V phase 3. [Up] : The offset of U, V phase are saved at PE-219, 220 and return to the menu ※ If you press [Enter] when you return to the menu after checking the offset, it will return to the menu without saving the offset
172	PC-813		[mV]	–	Save the offset data of analog speed command voltage

		Alalog Speed Cmd Offset	-1000	1000	automatically at [PE-402] 1. [Enter] : Display the current analog speed command voltage 2. [Up] : Return to the menu after the displayed value is saved as offset data of analog speed command voltage at [PE-402] ※ If you input 1 or 3 at [PE-420], it can be applied ※ If you press [Enter] when you return to the menu after checking the offset, it will return to the menu without saving the offset
173	PC-814	AlalogTorque Cmd Offset	[mV] -1000	- 1000	Save the offset data of analog torque command voltage automatically at [PE-407] 1. [Enter] : Display the current analog torque command voltage 2. [Up] :Return to the menu after the displayed value is saved as offset data of analog speed command voltage at [PE-407] ※ If you input 2 or 3 at [PE-420], it can be applied ※ If you press [Enter] when you return to the menu after checking the offset, it will return to the menu without saving the offset
174	PC-815	Maximum Load	[%] -300	- 300	Display the max. instantaneous load rate 1. [Enter] : Display 00000 initially 2. [Right] : The max. instantaneous load rate of CW rotation 3. [Left] : The max. instantaneous load rate of CCW rotation 4. [Up] : Clear the displayed load rate The value that you can see now is the one before clear 5. You can check again the max. instantaneous load rate after clear by pressing [Left] or [Right] key 6. [Enter]: Return to menu
175	PC-816	Feedback Pulse	[pulse] 9.9.9.9.9.9	- 999999	. Display the following position pulse 1. [Enter]: Display 00000 initially 2. [Up]: Clear the displayed following position pulse 3. [Enter]: Return to menu ※ '.' means reverse direction
176					
177			-	-	
178			- -	- -	
179	*PC-820	All Menu Data Init	- -	- -	Initialize all menu data as the status of O/S download 1. [Up] : Initialization is performed with ALL-CL message and return to the menu automatically (Note) Don't set the menu fixed by manufacturer

Appendix 2. Motor type and ID

ID	Model	Watt	Remarks
1	SAR3A	30	
2	SAR5A	50	
3	SA01A	100	
4	SA015A	150	
5			
6			
7	SBN01A	100	
8	SBN02A	150	
9	SBN04A	400	
10	SBN04A-BK	400	Customized
11	SB01A	100	
12	SB02A	200	
13	SB04A	400	
14	SB03A	250	Special type
15	HB02A	200	Hollow shaft
16	HB04A	400	Hollow shaft
17			
18			
19			
20			
21	SC04A	400	
22	SC06A	600	
23	SC08A	800	
24	SC10A	1000	
25	SC03D	300	
26	SC05D	450	
27	SC06D	550	
28	SC07D	650	
29			
30			
31			
32			
33	HC06H	600	For S/T

ID	Modle	Watt	Remarks
34	SC05A	450	For S/T
35	SC05H	500	For S/S
36	SC08A	750	For S/S
37	HB01A	100	Hollow shaft
38	HC10A	1000	Hollow shaft
39	HE30A	3000	Hollow shaft
40	HB03H	250	Semi-conductor
41	HC03H	250	Semi-conductor
42	HC03HC6	300	Semi-conductor
43			
44			
45			
46			
47			
48			
49			
50	SE15D	1500	Special type
51	SC20B	2000	Special type
52			
53			
54			
55			
56			
57			
58			
59			
60			
61	SE09A	900	
62	SE15A	1500	
63	SE22A	2200	
64	SE30A	3000	
65	SE06D	600	
66	SE11D	1100	

ID	Model	watt	Remarks
67	SE16D	1600	
68	SE22D	2200	
69	SE03M	300	
70	SE06M	600	
71	SE09M	900	
72	SE12M	1200	
73	SE05G	450	
74	SE09G	850	
75	SE13G	1300	
76	SE17G	1700	
77	HE09A	900	Hollow shaft
78	HE15A	1500	Hollow shaft
79	SE11M	1050	Special type
80	SE07D	650	Special type
81	SF30A	3000	
82			
83			
84			
85	SF22D	2200	
86	SF35D	3500	
87			
88			
89	SF12M	1200	
90	SF20M	2000	
91	SF30M	3000	
92	SF44M	4400	
93	SF20G	1800	
94	SF30G	2900	
95			
96			
97	SG35D	3500	
98			
99	HC05H	500	Customized

ID	Model	Watt	Remarks
100			
101	SE35D	3500	For DS only
102	SE30D	3000	Special type
103			For LG only
104			Special type
105	SE35A	3500	Special type
106			Special type
107			Special type
108	SF35A	3500	Special type
109	SE08D	750	Special type
110			
111	SG22D	2200	
112	SG35D	3500	
113			
114			
115			
116			
117			
118			
119			
120			
121	SG12M	1200	
122	SG20M	2000	
123	SG30M	3000	
124			
125			
126			
127			
128			
129			
130			
131	SG20G	1800	
132	SG30G	2900	

ID	Modle	Watt	Remarks
133			
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ID	Model	watt	Remarks
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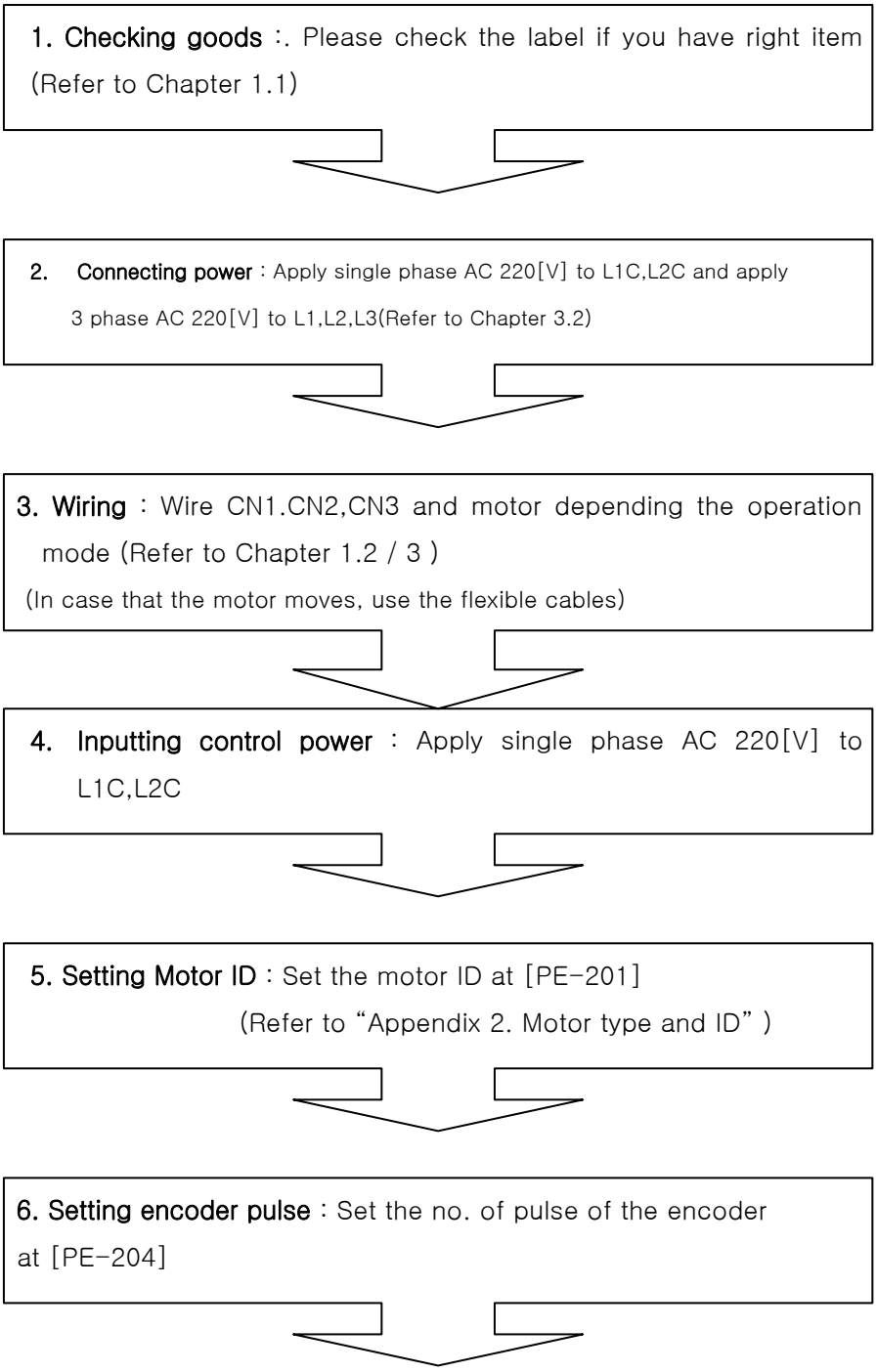
Appendix 3. Trial test procedures

Thank you for purchasing our products.

Please proceed with the trial test as below.


1. Checking goods :. Please check the label if you have right item (Refer to Chapter 1.1)
2. Connecting power : Apply single phase AC 220[V] to L1C,L2C and apply 3 phase AC 220[V] to L1,L2,L3(Refer to Chapter 3.2)
3. Wiring : Wire CN1.CN2,CN3 and motor depending the operation mode (Refer to Chapter 1.2 / 3)
(In case that the motor moves, use the flexible cables)
4. Inputting control power : Apply single phase AC 220[V] to L1C,L2C
5. Setting Motor ID : Set the motor ID at [PE-201]
(Refer to “Appendix 2. Motor type and ID”)
6. Setting encoder pulse : Set the no. of pulse of the encoder at [PE-204]

7. **Applying main power** : Apply 3 phases AC 220[V] to L1,L2,L3

8. **Test run** : If you activate[PC-803] with [Enter] key,
You can perform the test run manually.
* **[Up]** : Changing the operation speed ([PE-602]~[PE-604])
* **[Left]** : Motor's forward rotation
* **[Right]** : Motor's backward rotation

9. **Setting operation mode :**
You can set the operation mode at menu [PE-601]
"0" : Torque control
"1" : Speed control
"2" : Position control
"3" : Speed/Position control
"4" : Speed/Torque control
"5" : Position/Torque control

Speed operation

Position operation

10.You can perform speed operation by adjusting the below menu data
1) Setting speed operation variables:[PE-601~611]
2)Setting input/output variables
[PE-503, 504, 510, 511, 512, 514, 515]
3)Setting analog variables :[PE-401~405]
4)Setting control variables :
[PE-301, 307, 309, 311, 312, 313, 320]
(Refer to "Chapter4. Menu description")

11.You can perform position operation by adjusting the below menu data.

1)Setting position operation variables:[PE-701~711]
2) Setting input/output variables:
[PE-501, 502, 508, 509, 515,]
3) Setting control variables: [PE-301~320]
(Refer to "Chapter4. Menu description")

Guarantee Letter

Installed Date		Guaranteed period	
Model A		Serial No.	
Model B		Serial No.	
Model C		Serial No.	
Model D		Serial No.	
Customer	Name		
	Address		
	Tel.		
Distributor	Name		
	Address		
	Tel.		

These items are produced by MECAPION under our strict Q.C system and test procedure. The guaranteed period is 12 months from installation or 18 months from production. However, The guaranteed period can be changed by the condition of Purchasing agreement.

◈ A/S With Free

When some defect is happened, please contact our agent or A/S center.

We repair the defective item which is in the guaranteed period and using in normal operation condition

◈ A/S With Credit

Below case is not included in A/S With Free.

- ■ Defect from customer's intentional or careless mistake
- ■ Defect from Power supply or connecting device
- ■ Defect from natural disaster(fire, flood, earthquake, Gas accident)
- ■ The item which is not repaired or reconstructed at our agent or A/S center
- ■ The item which do not have MECAPION name plate
- ■ Defect after guaranteed period

※ After installation of our Servo, Please return this guarantee letter to our Q.A Dept.

Receiver: MECAPION Q.A Dept.

Tel: 82-53-593-0066(131), Fax: 82-53-591-8614